Feedforward Neural Network

Seminar: Klassifikation und Clustering WS23/24

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Feedforward Neural Networks

Background:

(1) History of Neural Networks (2) What is a Feedforward Neural Network? (3) Training a FFNN (4) Strengths & Limitations (5) Model Setup (6) Author Classification (7) Language Identification

(8) News Classification

(9) Sentiment Analysis

Our Implementation:

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The beginnings of Neural Networks

- **1943** First **computational model of a neuron** (McCulloch & Pitts)
- **1958 Perceptron** (Rosenblatt)



Source: https://www.slashcam.de/artikel/Wissen/Kuenstliche-Intelligenz-einfach-erklaert---Perzeptron--Backpropagation-und-Loss--Das-Perzeptron.html

The beginnings of Neural Networks

1969 Perceptron can only handle linearly separable data (Minsky & Papert)

1986 Mulit-layer Perceptron = Feedforward Neural Network

(Hinton, Rumelhart & Williams)



Source: https://indiantechwarrior.com/faster-r-cnn-objects-detection-without-slowness/

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What is a Feedforward Neural Network?



Figure 2: Feed-forward neural network with two hidden layers.

Source: Goldberg, Yoav (2015): 11

What is a Feedforward Neural Network?

$$NN_{Perceptron}(\mathbf{x}) = \mathbf{x}\mathbf{W} + \mathbf{b}$$

$$NN_{MLP2}(\mathbf{x}) = \mathbf{y}$$

$$\mathbf{h^1} = g^1(\mathbf{x}\mathbf{W^1} + \mathbf{b^1})$$

$$\mathbf{h^2} = g^2(\mathbf{h^1}\mathbf{W^2} + \mathbf{b^2})$$

$$\mathbf{y} = \mathbf{h^2}\mathbf{W^3}$$

x = input

g

- *h* = *hidden layer*
- *W* = weight matrix
- b = bias term
 - = non-linear activation function

Most common:

- Logistic = Sigmoid
- Hyperbolic Tangent = Tanh
- Rectified Linear Unit = ReLu

Logistic = Sigmoid



Source: https://wandb.ai/ayush-thakur/dl-question-bank/reports/ReLU-vs-Sigmoid-Function-in-Deep-Neural-Networks--VmlldzoyMDk0MzI

Hyperbolic Tangent

= Tanh



Rectified Linear Unit

= ReLU



Source: https://wandb.ai/ayush-thakur/dl-question-bank/reports/ReLU-vs-Sigmoid-Function-in-Deep-Neural-Networks--VmlldzoyMDk0MzI

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Training of A Neural Network - Gradient-Based Method

- Cost/Loss Function $L(\hat{y}, y)$: how error estimate is computed
 - the loss of predicting y-head when the true output is y
 - assigns a numerical score (a scalar) to the network's output y-head given the true expected output y.
- Training Objective:
 - minimize the loss across the different training examples
 - we need to repeatedly
 - computing an estimate of the error over the dataset
 - computing the gradient with respect to the error
 - and then moving the parameters in the direction of the gradient
- Backpropagation
 - move the parameters in the direction of the gradient
 - Basic Algorithm: stochastic gradient descent (SGD)

Loss Function: $L(\hat{y}, y)$ - How "Error" is defined

- Log Loss (Binary Cross-Entropy) (Binary Classification): $L(Y, P(Y|X)) = -\log P(Y|X)$
- Categorical Cross-Entropy Loss (Classification):

 $L_{cross-entropy}(\hat{\mathbf{y}}, \mathbf{y}) = -\sum y_i \log(\hat{y}_i)$

Hinge Loss (Binary/ Multiclass Classification):

 $L_{hinge(binary)}(\hat{y}, y) = \max(0, 1 - y \cdot \hat{y})$

 $L_{hinge(multiclass)}(\hat{\mathbf{y}}, \mathbf{y}) = \max(0, 1 - (\hat{y}_t - \hat{y}_k))$ Square loss (Regression): $L(Y, f(X)) = \sum_{i=1}^{n} (Y - f(X))^2$

Training of A Neural Network - Derivative and Gradients update

- Derivative/ Slope:
- local information
- the rate of change of a function at a particular point
- indicate how the loss changes with respect to each parameter
- determine the direction in which the parameters should be adjusted to minimize the loss



Figure 5.4 The first step in iteratively finding the minimum of this loss function, by moving w in the reverse direction from the slope of the function. Since the slope is negative, we need to move w in a positive direction, to the right. Here superscripts are used for learning steps, so w^1 means the initial value of w (which is 0), w^2 at the second step, and so on.

• Gradient Update with certain learning rate:

$$w^{t+1} = w^t - \eta \frac{d}{dw} L(f(x;w), y)$$

Stochastic Gradient Descent

Algorithm 1 Online Stochastic Gradient Descent Training

- 1: Input: Function $f(\mathbf{x}; \theta)$ parameterized with parameters θ .
- 2: Input: Training set of inputs $\mathbf{x_1}, \ldots, \mathbf{x_n}$ and outputs $\mathbf{y_1}, \ldots, \mathbf{y_n}$.
- 3: Input: Loss function L.
- 4: while stopping criteria not met do
- 5: Sample a training example $\mathbf{x}_i, \mathbf{y}_i$
- 6: Compute the loss $L(f(\mathbf{x_i}; \theta), \mathbf{y_i})$
- 7: $\hat{\mathbf{g}} \leftarrow \text{gradients of } L(f(\mathbf{x_i}; \theta), \mathbf{y_i}) \text{ w.r.t } \theta$
- 8: $\theta \leftarrow \theta + \eta_k \hat{\mathbf{g}}$

9: return θ

- optimize parameters to minimize the total loss over the training set
- parameters are updated in the direction of the gradient, scaled by a learning rate
- In SGD: Error is based on a single training example. ➡ Noise

Backpropagation Methods:

- Stochastic Gradient Descent Algorithm (SGD), mini-batch SGD
- Variants of SGD: SGD+Momentum (Polyak, 1964), Nesterov Momentum (Sutskever, Martens, Dahl, & Hinton, 2013)
- Adaptive learning rate algorithms: AdaGrad (Duchi, Hazan, & Singer, 2011), AdaDelta (Zeiler, 2012), RMSProp (Tieleman & Hinton, 2012) and Adam (Kingma & Ba, 2014)

Computation Graph View: Input Information Flow

- Forward Pass:
- compute the outputs of the nodes in the graph
 - traverse the nodes in a topological order
 - compute the output of each node given the already computed outputs of its predecessors



Computation Graph View: Training/ Backprop

- Backward Pass:
- computes the gradients with respect to that node's value
- derivative ∂ L /∂ a , tells us how much a small change in a affects L



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Strengths & Limitations

+ Simplicity

Compared to other complex neural network architectures

+ Nonlinearity

Nonlinear activation functions

→ capture non-linear relationship between input and output

+ Scalability

Layers and neurons can be added

- Sequential data processing

No Memory of previous inputs

- Fixed Input Size

Consistent number of features

→ padding/truncation

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Model Setup (PyTorch)

- 3 Fully connected layers
 - Author/Language, News: Hidden Sizes of [512, 512]
 - Sentiment: Hidden Sizes of [128, 64]
- Activation Function: ReLu (Rectified Linear Unit)
- Dropout: 0.5
 - randomly dropping some units and their connections from the network during training
- Loss Function: Cross Entropy Loss
- Optimizer: Adam



(b) After applying dropout.

Usage

- FNN often added after pretrained model for **downstream task**:
 - Pretrained model used for **feature extraction**
 - → Output of model fed into **FNN for final classification**

Examples:

- CNN (Convolutional Neural Network) + FNN (standard practice)
- LSTM (Long Short-Term Memory) + FNN
- GPT (Generative Pre-trained Transformer) + FNN

Feature Representations

• TF-IDF

• Unigrams, Bigrams

• Word2Vec

- Word2Vec embeddings from own dataset
- Pretrained Word2Vec GoogleNews embeddings (trained on Google News articles)

• **GloVe** (Global Vectors for Word Representation)

- Based on count-based model
- Trained on global word-word occurrence statistics

• Contextual Embeddings (bert-base-uncased)

• Fixed-sized representation of input sequence (pooling)

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Authors - TF-IDF - Unigrams

Epochs: 20, Batch Size: 64

	Precision	Recall	F1-score	Support
Franz Kafka	0.91	0.95	0.93	280
Friedrich Schiller	0.76	0.89	0.82	266
Henrik Ibsen	1.00	0.98	0.99	897
James Joyce	0.94	0.95	0.94	682
J.W. von Goethe	0.81	0.69	0.74	228
Virginia Woolf	0.98	0.98	0.98	1901
Wilhelm Busch	0.97	0.96	0.96	627
Accuracy			0.95	4881
Macro Average	0.91	0.91	0.91	4881
Weighted Average	0.95	0.95	0.95	4881

Authors - TF-IDF - Unigrams



Authors - TF-IDF - Bigrams

Epochs: 20, Batch Size: 64

	Precision	Recall	F1-score	Support
Franz Kafka	0.82	0.82	0.82	280
Friedrich Schiller	0.69	0.76	0.73	266
Henrik Ibsen	0.99	0.98	0.99	897
James Joyce	0.92	0.86	0.89	682
J.W. von Goethe	0.70	0.57	0.63	228
Virginia Woolf	0.95	0.97	0.96	1901
Wilhelm Busch	0.90	0.93	0.91	627
Accuracy			0.91	4881
Macro Average	0.85	0.84	0.85	4881
Weighted Average	0.91	0.91	0.91	4881

Authors - TF-IDF - Bigrams



Authors - Word2Vec Embeddings

Epochs: 30, Batch Size: 64

	Precision	Recall	F1-score	Support
Franz Kafka	0.66	0.61	0.63	280
Friedrich Schiller	0.47	0.56	0.51	266
Henrik Ibsen	0.97	0.94	0.96	897
James Joyce	0.76	0.74	0.75	682
J. W. von Goethe	0.43	0.45	0.44	228
Virginia Woolf	0.91	0.92	0.91	1901
Wilhelm Busch	0.84	0.82	0.83	627
Accuracy			0.83	4881
Macro Average	0.72	0.72	0.72	4881
Weighted Average	0.83	0.83	0.83	4881

Authors - Word2Vec Embeddings



Authors - GloVe Pre-trained Embeddings

Epochs: 25, Batch Size: 64

	Precision	Recall	F1-score	Support
Franz Kafka	0.67	0.68	0.67	280
Friedrich Schiller	0.49	0.51	0.50	266
Henrik Ibsen	1.00	0.96	0.98	897
James Joyce	0.85	0.66	0.74	682
J.W. von Goethe	0.43	0.54	0.48	228
Virginia Woolf	0.88	0.96	0.92	1901
Wilhelm Busch	0.87	0.81	0.84	627
Accuracy			0.84	4881
Macro Average	0.74	0.73	0.73	4881
Weighted Average	0.84	0.84	0.84	4881

Authors - GloVe Pre-trained Embeddings



Author Classification - Overview

	Accuracy	Macro F1	Weighted F1
TF-IDF (Unigrams)	0,95	0,91	0,95
TF-IDF (Bigrams)	0,91	0,85	0,91
Word2Vec Embeddings	0,83	0,72	0,83
GloVe Pre-trained Embeddings	0,84	0,73	0,84
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Languages - TF-IDF - Unigrams

Epochs: 2, Batch Size: 64

	Precision	Recall	F1-score	Support
da	1.00	1.00	1.00	844
de	1.00	1.00	1.00	1448
en	1.00	1.00	1.00	2519
fr	1.00	0.92	0.96	38
it	0.96	0.78	0.86	32
Accuracy			1.00	4881
Macro Average	0.99	0.94	0.96	4881
Weighted Avera	ge 1.00	1.00	1.00	4881

Languages - TF-IDF - Unigrams



Languages - TF-IDF - Bigrams

Epochs: 2, Batch Size: 64

	Precision	Recall	F1-score	Support
da	1.00	0.99	0.99	844
de	0.99	1.00	0.99	1448
en	0.99	1.00	0.99	2519
fr	1.00	0.50	0.67	38
it	0.67	0.06	0.11	32
Accuracy			0.99	4881
Macro Average	0.93	0.71	0.75	4881
Weighted Average	ge 0.99	0.99	0.98	4881

Languages - TF-IDF - Bigrams



Languages - Word2Vec Embeddings

Epochs: 15, Batch Size: 64

	Precision	Recall	F1-score	Support
da	0.98	0.97	0.98	844
de	0.98	0.99	0.99	1448
en	0.99	0.99	0.99	2519
fr	0.90	0.68	0.78	38
it	0.76	0.78	0.77	32
Accuracy			0.98	4881
Macro Average	0.92	0.88	0.90	4881
Weighted Average	0.98	0.98	0.98	4881

Languages - Word2Vec Embeddings



Languages - GloVe Pre-trained Embeddings



Not used for language identification because these are pre-trained embeddings for English words.

It doesn't make sense to use them to identify different languages.

Language Identification - Overview

	Accuracy	Macro F1	Weighted F1
TF-IDF (Unigrams)	1,00	0,96	1,00
TF-IDF (Bigrams)	0,99	0,75	0,98
Word2Vec Embeddings	0,98	0,90	0,98

Conclusion for the Letter Dataset

Both author classification and language identification with a FFNN yield best results with simple TF-IDF vector representations of the letters.

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News Classification - Huffington Post

['headline', 'short_description']

• TF-IDF

• Unigrams, Bigrams

• Word2Vec

- Word2Vec embeddings from own dataset
- Pretrained Word2Vec GoogleNews embeddings (trained on Google News articles)

• **GloVe** (Global Vectors for Word Representation)

- Based on count-based model
- \circ $\,$ $\,$ Trained on global word-word occurrence statistics $\,$

['headline', 'short_description']

News - TF-IDF Unigrams

Epochs: 5, Batch Size: 64

Accuracy: 0.5308 F1-Score: 0.5305

- 1. Weddings: 0.7465
- 2. Divorce: 0.7437
- 3. Queer Voices: 0.6972

	precision	recall	f1-score	support
BLACK VOICES	0.5045	0.4311	0.4649	392
BUSINESS	0.3932	0.3974	0.3953	380
COLLEGE	0.6049	0.4623	0.5241	212
COMEDY	0.4201	0.4612	0.4397	399
CRIME	0.5681	0.6528	0.6075	409
CULTURE & ARTS	0.5353	0.6196	0.5744	673
DIVORCE	0.7851	0.7064	0.7437	419
EDUCATION	0.4813	0.5202	0.5000	198
ENTERTAINMENT	0.4362	0.3798	0.4061	387
ENVIRONMENT	0.5053	0.5324	0.5185	355
FIFTY	0.4106	0.3700	0.3892	273
GOOD NEWS	0.4071	0.3016	0.3465	305
HEALTHY LIVING	0.2684	0.3212	0.2925	386
HOME & LIVING	0.6768	0.6891	0.6829	386
IMPACT	0.3832	0.3525	0.3672	400
MEDIA	0.5570	0.6304	0.5914	395
MONEY	0.5520	0.5895	0.5701	324
PARENTING	0.4278	0.4322	0.4300	391
POLITICS	0.4354	0.4738	0.4538	420
QUEER VOICES	0.7385	0.6602	0.6972	415
RELIGION	0.6253	0.6182	0.6217	440
SCIENCE	0.6253	0.5483	0.5843	414
SPORTS	0.6033	0.7049	0.6502	410
STYLE	0.5318	0.4455	0.4848	413
STYLE & BEAUTY	0.5501	0.6880	0.6114	391
TASTE	0.7308	0.6222	0.6721	397
TECH	0.6615	0.6106	0.6350	416
TRAVEL	0.5641	0.5975	0.5803	405
WEDDINGS	0.7610	0.7325	0.7465	400
WEIRD NEWS	0.4230	0.3431	0.3789	408
WELLNESS	0.3347	0.3956	0.3626	407
WOMEN	0.4131	0.4100	0.4115	400
WORLD	0.6166	0.5891	0.6025	404
accuracy			0.5308	12824
macro avg	0.5313	0.5239	0.5254	12824
weighted avg	0.5346	0.5308	0.5305	12824

Confusion Matrix

- 0.7

- 0.6

- 0.5

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

	BLACK VOICES	43.11%	0.51% 1	1.28% 2	.30% 7.65	% 4.08%	0.00% 2.3	10% 4.34%	6 0.00% (0.26% 0.51	% 0.77%	0.00% 3	.06% 2	.81% 1.0	2% 1.79	62.81%	1.28%	2.04% 0	0.00% 6.89	% 1.79%	3.06% 0.00%	% 1.02%	1.53% 0	.51% (0.26% 1.02	% 1.79%	0.26%	
	BUSINESS -	-1.05%	39.74% <mark>0</mark>	0.79% 0	.79% 0.79	% 1.84%	1.58% 1.3	2% 0.26%	6 2.63%	1.32% 1.05	% 4.21%	0.79% 4	1.47% 3.	.16% 9.2	1% 0.53	% 3.95%	1.05%	0.79%]	.32% 0.79	% 0.00%	0.53% 0.79	% 5.79%	1.32% 0	.26%]	1.58% 3.95	% 1.32%	1.05%	
	COLLEGE -	-3.77%	1.42%	6.23%0	.47% 1.89	% 2.83%	0.00% 8.4	9% 0.00%	6 0.94% (0.94% 0.94	% 0.47%	0.00% 2	.36% 5.	.66% 4.2	5% 1.42	62.36%	0.94%	2.36% 0	0.00% 2.36	% 1.89%	0.47% 0.00%	% 0.00%	0.94% 0	.47% 0	0.47% 0.94	1% 3.77%	0.94%	
	COMEDY -	2.01%	0.75% 0	0.75%	5.12% <mark>0.75</mark>	% 4.26%	1.00% 0.5	0% 5.51%	6 1.75% (0.75% 1.50	% 2.01%	1.75% 0	0.25% 3.	26% 0.2	5% 1.25	6 4.01%	1.00%	1.50% 1	.75% 3.01	% 2.26%	1.75% 0.50%	% 1.00%	0.75% 0	.50% 3	3.26% 1.25	% 2.769	0.25%	
	CRIME	-1.96%	0.49% 0	0.49% 0	.73%55.28	<mark>%</mark> 0.98%	0.24% 0.7	3% 0.49%	62.44%	0.24% 1.22	% 0.98%	0.24% 0	0.49% 0.	.98% 0.4	9% 1.71	6 4.16%	0.98%	2.69% 0	0.24% 1.22	% 0.24%	0.24% 0.24%	% 0.49%	1.22% 0	.24%3	8.91% 0.73	\$% 1.22%	1.96%	
0	ULTURE & ARTS	-3.12%	0.59% 0	0.30% 1	.78% 0.59	<mark>%</mark> 51.969	0.15% 0.7	4% 3.12%	6 0.59% 1	L.19% 0.89	% 0.59%	0.74% 1	.49% 1.	.34% 0.3	0% 0.89	% 0.15%	1.34%	1.49% 2	.38% 1.63	% 0.45%	1.63% 0.59%	% 1.04%	1.78% 0	.30% 1	L.19% 1.34	% 3.27%	1.04%	
	DIVORCE -	-0.00%	0.24% 0	0.72% 1	.19% 0.72	% 0.00%	70.64%0.4	8% 1.67%	6 0.00% 2	15% 0.00	% 1.43%	0.48% 0	0.72% 0	.00% 1.4	3% 1.67	6 0.48%	1.19%	0.48% (0.48% 0.72	% 0.48%	0.95% 0.24%	% 0.48%	0.72% 5	.49% (0.48% 1.91	% 2.15%	0.24%	
	EDUCATION -	-1.01%	3.03% 6	5.06% 1	.01% 1.52	% 3.03%	0.51% <mark>52.0</mark>	0.51%	6 1.01% (0.51% 1.52	% 1.01%	0.51% 4	1.04% 0.	.51% 3.0	3% 5.05	6.57%	0.00%	1.01% (0.00% 1.01	% 0.00%	0.00% 0.00%	% 1.01%	0.00% 0	.00% (0.00% 3.03	% 0.00%	1.52%	
1	NTERTAINMENT	-5.43%	0.26% 0	0.00% 9	.04% 1.03	% 8.01%	0.52% 0.0	1 0% 37.98%	0.52% (0.78% 1.03	% 0.52%	0.26% 1	29% 4.	.13% 0.5	2% 0.78	%2.58%	1.03%	1.81% 1	.55% 1.55	% 3.36%	4.39% 0.00%	% 1.55%	0.52% 1	.03% 2	2.84% 0.53	% 4.91%	0.26%	
	ENVIRONMENT	-0.85%	1.97% 0	0.28% 2	.82% 1.97	% 1.97%	0.28% 0.5	6% 0.56%	653.24%(0.85% 3.38	% 2.25%	1.41% 2	.82% 1.	.97% 0.8	5% 1.13	6 3.38%	0.28%	0.56%3	.94% 0.85	% 0.28%	0.28% 0.56%	% 0.28%	1.69% 0	.00% 4	4.23% 1.97	% 0.28%	2.25%	
	FIFTY -	-1.10%	2.20% 0	0.37% 1	.83% 0.37	%2.56%	1.83% 0.7	3% 0.00%	6 0.37%	7.00% <mark>0.73</mark> '	% 9.16%	1.47% 2	.20% 1.	.10% 2.9	3% 5.49	6 0.73%	1.83%	1.47% 0	0.37% 0.00	% 1.83%	1.83% 0.73%	% 0.73%	5.13% 2	.56% (0.37% 8.43	% 2.569	0.00%	
	GOOD NEWS	-1.31%	1.31% 0	0.00% 2	.30% 3.61	% 3.28%	0.33% 0.9	8% 1.64%	6.56%	1.31%30.16	% 3.93%	0.98% 4	.92% 0.	.98% 0.9	8% 5.57	6 0.98%	1.64%	0.66% (0.98% 2.62	% 1.64%	0.98% 0.98	% 1.64%	2.30% 0	.66%1	0.49%1.97	% 1.64%	0.66%	
	HEALTHY LIVING	-0.26%	3.89% 0	0.78% 2	.59% 0.00	% 1.55%	5 1.30% 0.5	2% 1.81%	6 1.04% 4	1.15% 1.30	%32.12%	1.55% 2	.59% 0	1.52% 0.2	6% 3.63	% 1.81%	1.04%	1.04% 3	.11% 2.33	% 0.52%	0.78% 1.81%	6 0.78%	0.52% 0	.52% (0.26%21.5	0%3.37%	0.78%	
	HOME & LIVING	-0.52%	0.52% 0	0.00% 1	.04% 0.52	% 5.44%	0.26% 0.0	0% 1.04%	6 1.30% 1	1.04% 0.26	% 1.55%	8.91%0	0.26% 0	.52% 1.0	4% 2.07	% 0.26%	0.00%	0.00% 0	0.00% 0.78	% 1.04%	3.89% 1.30%	6 0.78%	1.81% 0	.52% (0.52% 1.30	1% 1.55%	0.00%	
	IMPACT -	-1.50%	5.00% 1	1.00% 1	.25% 1.25	% 4.00%	0.25% 2.2	5% 1.50%	6 4.00% 1	1.25% 3.25	% 6.00%	0.50%	5.25% <mark>1</mark> .	.50% 2.0	0% 4.25	% 3.00%	1.75%	2.75% 1	.00% 1.50	% 0.75%	1.00% 0.25%	% 1.00%	0.75% 0	.25% (0.50% 3.00	% 3.00%	3.50%	
0	MEDIA	-1.52%	2.28% 0	0.51% 5	.57% 0.76	% 1.52%	0.00% 0.7	6% 1.27%	6 0.76% (0.00% 0.25	% 1.52%	0.00% 1	.01%53	3.04% <mark>0.7</mark>	6% 0.51	% 7.59%	0.25%	1.01% (0.25% 2.03	% 1.01%	0.76% 0.00%	% 1.27%	0.51% 0	.25% (0.51% 0.00	0% 1.27%	1.27%	
e Labe	MONEY	-0.00%	8.33%2	2.16% 0	.31% 0.93	% 1.85%	0.31% 0.6	2% 0.31%	6 0.93% 1	L.54% 0.31	% 1.23%	2.47% 1	.23% 0.	.31%58.9	95% <mark>1.23</mark>	62.16%	0.00%	0.93% (0.93% 1.23	% 0.31%	1.54% 0.93	% 1.54%	2.16%1	.54% (0.31% 2.78	\$% 0.62%	0.00%	
2	PARENTING	-0.26%	1.79% 0	0.51% 2	.81% 0.51	% 3.07%	1.28% 4.8	6% 1.02%	6 0.77% 2	2.81% 2.81	% 5.63%	1.02% 4	1.60% 0.	.77% 0.5	1%43.22	0.51%	0.77%	0.77% (0.26% 1.02	% 1.02%	2.81% 1.02%	6 0.51%	1.02% 0	.51% 1	L.28% 4.8	5% 4.86%	0.51%	
	POLITICS	-2.38%	5.24% 0	0.24% 3	.33% 3.10	% 1.19%	0.24% 0.9	5% 0.95%	6 3.33% (0.48% 0.48	% 1.90%	0.00% 2	.38% 6	.43% 1.6	7% 0.00	<mark>6</mark> 47.389	1.19%	3.81% 0	0.24% 1.43	% 0.48%	0.24% 0.00%	% 0.95%	0.71% 0	.00% (0.71% 0.9	i% 2.389	5.24%	
	QUEER VOICES	-1.45%	0.24% 0	0.24% 0	.96% 1.20	% 3.86%	0.96% 0.7	2%2.65%	6 0.48% (0.48% 0.00	% 1.45%	0.48% 1	.20% 1.	.20% 0.2	4% 2.41	% 2.89%	56.02%	2.17% 0	0.00% 0.96	% 0.48%	0.48% 0.00%	% 0.24%	0.48% 1	.93% (0.72% 1.45	% 0.96%	0.96%	
	RELIGION	-1.59%	1.36% 0	0.45% 0	.68% 2.50	% 3.41%	0.23% 0.9	1% 0.45%	6 0.45% 1	L.59% 0.91	% 1.82%	0.23% 2	.95% 1.	.36% 0.4	5% 1.36	6 2.50%	2.27%	51.82%	0.45% 0.68	% 0.45%	0.00% 0.00%	% 0.00%	1.14%0	.68% (0.68% 1.59	% 1.14%	3.86%	
	SCIENCE	-0.24%	1.69% 0	0.00% 0	.97% 0.72	%2.17%	0.00% 0.4	8% 0.72%	6.28%	L.21% 0.00 ⁴	% 5.56%	1.69% 0	0.72% 0.	.48% 0.2	4% 3.14	6 0.48%	0.00%	0.48%	4.83% <mark>2.17</mark>	% 0.72%	0.48% 0.97	% 1.93%	1.93% 0	.24%2	2.42% 5.01	% 0.72%	1.21%	
	SPORTS	-1.22%	0.49% 0	0.49% 1	.95% 2.44	% 1.95%	6 0.00% 0.0	0% 0.49%	6 0.24% (0.49% 1.46	% 0.73%	0.00% 2	.20% 1	.46% 0.2	4% 1.46	6 1.95%	0.73%	0.49% (0.98%70.49	9% 0.49%	0.49% 0.24%	% 0.49%	1.71% 0	.00% (0.98% 0.91	\$% 0.98%	1.71%	
	STYLE	-3.15%	1.69% 0	0.00% 3	.15% 0.73	% 3.39%	0.24% 0.2	4% 4.36%	6 0.48% (0.24% 0.48	% 1.21%	1.94% 0	0.48% 0.	.48% 0.4	8% 1.45	6 0.48%	0.24%	0.24% (0.97% 1.45	<mark>%</mark> 44.55%	18.64%1.69%	6 0.97%	1.69% 0	.97% (0.48% 0.48	\$% 2.66%	0.24%	
	TYLE & BEAUTY	-1.02%	0.51% 0	0.00% 0	.51% 0.00	% 2.56%	0.51% 0.5	1% 1.53%	6 0.00% (0.51% 0.00	% 1.02%	2.56% 0	0.26% 0	.77% 0.0	0% 0.51	% 0.00%	0.00%	0.26% (0.00% 1.28	%11.51%	58.80% 0.00%	% 0.26%	1.79% 0	.26% (0.26% 1.02	% 1.53%	0.26%	
	TASTE	-0.76%	2.02% 0	0.25% 0	.76% 0.50	%2.77%	0.50% 0.0	10% 1.51%	6 1.01% (0.25% 0.25	% 1.51%	4.79% 0	0.76% 0	.25% 0.7	6% 1.26	6 0.25%	0.00%	0.76%]	.01% 1.26	% 1.26%	0.25%52.22	<mark>%0.25%</mark>	4.28% 1	.26% 3	8.53% 2.7	% 0.76%	0.25%	
	TECH	-0.72%	7.21% 0	0.24% 2	.16% 1.92	% 1.20%	0.00% 0.7	2% 0.72%	6 0.48% 1	L.20% 0.48	% 0.00%	0.24% 0	0.24% 2	.40%2.6	4% 2.40	% 1.92%	0.00%	0.72%2	.16% 0.24	% 0.00%	0.00% 0.24	<mark>%</mark> 51.06%	0.96% 0	.48%2	2.16% 0.72	1.68%	2.64%	
	TRAVEL	-0.49%	1.73% 0	0.00% 0	.74% 0.99	%8.15%	0.25% 0.0	10% 0.25%	6 2.47% 1	L.48% 0.99	% 0.74%	1.48% 1	48% 0	.25% 1.2	3% 0.99	% 0.49%	0.49%	0.74% 1	.23% 0.99	% 0.74%	1.23% 3.95%	6 0.00%	59.75% <mark>0</mark>	.49% 1	1.23% 1.48	% 0.74%	2.72%	
	WEDDINGS -	-0.25%	0.00% 0	0.00% 0	.75% 0.75	% 2.00%	5.00% 0.0	0% 1.00%	6 0.00% 1	L.50% 0.50'	% 0.50%	1.00% 0	0.25% 0	.50% 1.2	5% 1.50	6 0.25%	0.50%	0.50% (0.00% 0.75	% 0.50%	2.50% 0.25%	% 0.25%	1.00%	3.25%	0.50% 2.25	i% 0.75%	0.00%	
	WEIRD NEWS	-0.25%	0.74% 0	0.25% 6	.13% 9.07	% 4.17%	0.49% 0.0	1.96%	6 4.17% (0.49% 4.66	% 2.21%	1.72% 0	0.25% 1.	.96% 1.2	3% 1.47	6 1.72%	0.25%	1.23% 2	.94% 2.70	% 2.45%	0.25% 3.43%	% 2.70%	3.19% 0	.74%3	4.31%0.98	3% 1.23%	0.74%	
	WELLNESS -	-0.74%	2.21% 0	0.00% 1	.72% 0.25	% 2.95%	1.97% 0.9	8% 0.25%	6 0.74%	L.72% 1.47	%20.39%	1.47% 2	.95% 0	.74% 1.4	7% 2.46	% 0.98%	0.49%	1.23% 3	.19% 0.25	% 0.98%	0.98% 1.72%	6 1.72%	0.98% 0	.00% 0	0.49%89.5	69 <mark>2.70</mark> 9	0.25%	
	WOMEN -	-1.50%	1.50% 1	1.00% 2	.50% 1.00	% 3.00%	0.75% 0.2	5% 3.50%	0.25%	3.75% 0.50	% 5.50%	0.75% 3	.75% 2	.25% 1.5	0% 2.50	% 3.00%	2.00%	1.75% (0.25% 1.75	% 3.50%	2.50% 0.50%	% 1.00%	0.25% 0	.75%]	1.50% 4.00	% 41.009	0.50%	
	WORLD -	-0.74%	0.99% 0	0.25% 0	.25% 2.72	% 2.23%	0.25% 0.2	5% 0.50%	6 2.23% (0.25% 1.49	% 0.74%	0.25% 3	.47% 1.	.98% 0.2	5% 0.25	% 5.45%	0.00%	4.21% 1	.24% 1.49	% 0.00%	0.00% 0.00%	% 1.73%	3.71% 0	.50% 1	L.98% 1.24	% 0.50%	58.91%	
		CK VOICES -	BUSINESS -	- COLLEGE -	COMEDY - CRIME -	JRE & ARTS -	DIVORCE -	TAINMENT -	IRONMENT -	- FIFTY -	THY LIVING -	E & LIVING -	IMPACT -	MEDIA -	MUNET -	POLITICS -	ER VOICES -	- NOISION -	SCIENCE - SPORTS -	- STYLE -	- K BEAUTY - TASTE -	TECH -	TRAVEL -	WEDDINGS -	EIRD NEWS -	WOMEN -	- MORLD -	
		BLA				CULTL		ENTER	ENV	õ	HEAL	МОН					QUE				STYLE				W.			

	precision	recall	f1-score	support
BLACK VOICES	0.5061	0.4209	0.4596	392
BUSINESS	0.4158	0.4026	0.4091	380
COLLEGE	0.5349	0.5425	0.5386	212
COMEDY	0.4609	0.4436	0.4521	399
CRIME	0.6183	0.5623	0.5890	409
CULTURE & ARTS	0.6778	0.5438	0.6035	673
DIVORCE	0.7923	0.7375	0.7639	419
EDUCATION	0.5650	0.5051	0.5333	198
ENTERTAINMENT	0.4114	0.3902	0.4005	387
ENVIRONMENT	0.5122	0.5324	0.5221	355
FIFTY	0.3391	0.3590	0.3488	273
GOOD NEWS	0.3951	0.3148	0.3504	305
HEALTHY LIVING	0.2625	0.3549	0.3018	386
HOME & LIVING	0.6682	0.7306	0.6980	386
IMPACT	0.3951	0.3200	0.3536	400
MEDIA	0.6058	0.6304	0.6179	395
MONEY	0.5468	0.5772	0.5616	324
PARENTING	0.4008	0.5013	0.4455	391
POLITICS	0.4415	0.4762	0.4582	420
QUEER VOICES	0.7113	0.6530	0.6809	415
RELIGION	0.6459	0.5886	0.6159	440
SCIENCE	0.5990	0.5990	0.5990	414
SPORTS	0.5956	0.7220	0.6527	410
STYLE	0.4492	0.5569	0.4973	413
STYLE & BEAUTY	0.6606	0.6522	0.6564	391
TASTE	0.6675	0.7128	0.6894	397
TECH	0.5476	0.6635	0.6000	416
TRAVEL	0.6412	0.6000	0.6199	405
WEDDINGS	0.7488	0.7525	0.7506	400
WEIRD NEWS	0.4194	0.3824	0.4000	408
WELLNESS	0.3747	0.3563	0.3652	407
WOMEN	0.4254	0.4275	0.4264	400
WORLD	0.6278	0.5594	0.5916	404
accuracy			0.5371	12824
macro avg	0.5353	0.5325	0.5319	12824
weighted avg	0.5421	0.5371	0.5375	12824

News - TF-IDF Unigrams

Epochs: 20, Batch Size: 64

Accuracy: 0.5371 F1-Score: 0.5375

- 1. Weddings: 0.7506
- 2. Divorce: 0.7639
- 3. Taste: 0.6894

Confusion Matrix

- 0.7

- 0.6

- 0.5

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

BLACK VOICES	42.09%	0.77% 1	.79% 2.5	55% 5.8	7% 2.55%	6 0.00% 2	2.30% 5.36	% 0.00%	0.26%	0.26% 1.0	02% 0.51	% 3.57%	2.30% 0.	51% 1	.79% 3.	32% 1.0	2% 3.57	% 0.26%	7.40% 1.	53% 2.5	5% 0.00	%2.04%	0.77%	1.02% 1	.02% 0.	51% 1.:	28% 0.26	%	
BUSINESS	-1.05%	40.26% <mark>1</mark>	.58% 0.7	79% 1.0	5% 0.79%	6 0.26% 1	1.58% 0.26	% 1.84%	2.11%	0.53% 5.5	53% 1.05	% 3.16%	2.37% 9	74% 1	.05% 3.4	42% 0.7	9% 0.79	% 1.05%	1.58% 0.	79% 0.0	0% 1.58	% 8.68%	5 1.58%	0.53% (0.79% 1.	84% 0.1	79% 0.79	%	
COLLEGE	-3.77%	1.89%	.25% <mark>0.</mark> 4	47% 1.4	2% 1.89%	6 0.47%	5.19% 0.00	% 0.47%	0.94%	0.47% 2.3	36% 0.94	% 0.94%	3.30% 2.	36% 2	.36%2.	83% 0.9	4% 1.89	% 1.42%	2.83% 1.	42% 0.0	0% 0.94	% 0.94%	6 0.00%	0.47% 0	0.00% 0.	47% 1.	39% 0.47	%	
COMEDY	-1.25%	1.75% 0	.50% 14.	36% <mark>0.2</mark>	5% 2.01%	6 0.50% (0.00% 7.77	% 2.26%	1.75%	1.50% 1.0	00% 1.50	% 0.75%	3.76% 0.	50% 1	.75% 3.	51% 1.0	0% 1.50	% 1.75%	2.76% 4.	01% 1.2	5% 0.50	% 1.75%	6 0.25%	1.00% 4	1.26% <mark>0</mark> .	00% 2.	76% 0.50	%	
CRIME	-6.11%	0.49% 0	.49% 0.2	24%56.2	2 <mark>3%</mark> 0.24%	% 0.49% (0.24% 0.00	% 1.47%	0.24%	1.47% 1.7	71% 0.24	% 0.24%	0.73% 0.	98% 2	.93% 3.	67% 0.9	8% 2.69	% 0.24%	2.69% 0.	49% 0.0	0% 0.24	%2.69%	6 1.22%	0.24%6	i.85% 0.	00% 2.4	44% 0.98	%	
CULTURE & ARTS	-2.82%	0.59% 0	.89% 1.3	34% 0.4	5%54.38	<mark>%</mark> 0.15% (0.15% 4.46	% 0.89%	1.93%	0.74% 1.6	53% 1.78	% 1.34%	1.19% 0.	45% 0	0.89% 0.	45% 1.6	3% 1.04	% 3.12%	1.19% 1.	49% 1.3	4% 0.74	% 1.78%	2.08%	0.59%]	.93% 1.	34% 3.1	36% 1.34	%	
DIVORCE	-0.00%	0.48% 0	.72% 1.1	19% 0.7	2% 0.48%	673.75%	0.24% 1.19	% 0.00%	2.63%	0.00% 0.0	00% 0.48	% 0.00%	0.00% 1	19% 2	.15% 0.	24% 1.4	3% 0.24	% 0.24%	0.24% 0.	72% 0.7	2% 0.00	% 0.95%	6 0.72%	4.53% 0	0.72% 2.	39% 1.4	43% 0.24	%	
EDUCATION	-1.01%	1.52%10	0.61%0.5	51% 0.5	1% 1.52%	% 2.02%	0.51% <mark>0.51</mark>	% 0.51%	1.52%	1.52% 1.0	01% 0.00	% 3.03%	0.51% 3.	03% 5	.56% 4.	55% 0.5	1% 2.02	% 0.51%	1.01% 0.	51% 0.0	0% 0.51	% 1.01%	6 0.00%	0.00% (0.00% 2.	02% 0.0	00% 2.02	%	
ENTERTAINMENT	-4.13%	0.78% 0	.00% 8.7	79% 1.0	3% 5.689	6 1.55% (0.52% <mark>39.0</mark> 2	0.26%	1.03%	1.55% 0.	78% 0.00	% 1.29%	2.58% 0.	26% 1	.81% 3.	10% 1.8	1% 0.2€	% 1.29%	3.36% 5.	68% 2.0	7% 0.78	% 1.81%	6 0.52%	0.78%]	.81% 0.	52% 4.1	91% 0.26	%	
ENVIRONMENT	-0.85%	3.10% 0	.56% 1.1	13% 0.8	5% 0.56%	6 0.00% (0.00% 0.56	<mark>%</mark> 53.24%	1.13%	5.20% 1.9	97% 1.13	% 2.25%	1.69% 0.	28% 1	.13% 3.	56% 0.0	0% 0.85	% 5.35%	0.28% 1.	13% 0.0	0% 0.85	% 1.41%	6 1.13%	0.00% 4	.23% 1.	13% 0.:	28% 3.10	%	
FIFTY	-0.73%	1.47% 0	.37% 1.8	33% 0.0	0% 1.83%	6 2.20% (0.73% 0.00	% 0.37%	35.90%	1.10% 9.3	1.10	% 1.47%	1.10% 4.	76% 6	.96% 0.	73% 1.4	7% 0.37	% 1.47%	0.73% 4.	03% 0.7	3% 1.479	% 1.83%	3.66%	1.47% (0.37% 7.	33% 2.	93% 0.37	%	
GOOD NEWS	-1.31%	1.31% 0	.66% 0.6	56% 2.3	0% 1.31%	6 0.33% 0	0.66% 2.62	% 7.54%	1.31%3	1.48%1.3	31% 0.66	% 4.92%	0.66% 0.	66% 6	.89% 0.	98% 0.6	6% 0.66	% 1.97%	2.30% 4.	92% 0.6	6% 0.98	% 1.64%	52.62%	1.31%1	0.82%1.	97% 1.	54% 0.33	%	
HEALTHY LIVING	-0.52%	2.33% 1	.30% 1.8	31% 0.2	6% 0.26%	6 1.30% (0.00% 1.04	% 1.04%	4.15%	0.52%35.	49%1.30	% 2.07%	0.78% 1.	.04% 3	.89% 1.	04% 1.5	5% 0.78	% 4.40%	2.07% 3.	37% 0.0	0% 2.33	% 1.81%	0.26%	1.04% 0	0.52%17	.36%4.:	15% 0.26	%	
HOME & LIVING	-0.52%	1.04% 0	.00% 0.5	52% 0.5	2% 2.59%	6 0.00% (0.52% 1.04	% 0.26%	0.52%	0.26% 2.1	85%73.06	<mark>%</mark> 0.52%	0.52% 1	.04% 2	.85% 0.	52% 0.0	0% 0.00	% 0.00%	0.78% 0.	78% 3.6	3% 1.559	% 0.52%	5 1.04%	0.26% 0	0.26% 1.	81% 0.:	26% 0.00	76	
IMPACT	-1.75%	4.25% 1	.00% 0.7	75% 1.2	5% 1.50%	6 0.75% 2	2.50% 1.00	% 4.50%	1.75%	2.75% 4.3	75% 1.50	%32.00%	61.25% 3.	00% 5	.00% 4.	25% 1.7	5% 2.50	% 0.75%	1.75% 3.	50% 0.0	0% 1.25	% 1.25%	6 0.75%	0.25% (0.75% 2.	50% 3.3	75% 3.75	%	
MEDIA	-0.76%	1.52% 0	.51% 4.5	56% 0.5	1% 1.279	% 0.25% (0.76% 2.03	% 0.51%	0.25%	0.51% 1.2	27% 0.25	% 0.76%	53.04% <mark>0</mark> .	51% 0	0.76% 7.	85% 0.5	1% 0.51	% 1.27%	1.01% 1.	01% 0.2	5% 0.00	% 3.29%	0.00%	0.00%]	.01% 0.	51% 1.	52% 1.27	%	
MONEY	-0.31%	7.72% 2	.16% 0.0	00% 1.5	4% 0.93%	6 0.00% (0.31% 0.31	% 0.62%	2.47%	0.31% 0.9	93% 1.54	% 1.54%	0.00%57	.72%1	.23% 2.	78% 0.3	1% 1.23	% 0.31%	0.93% 1.	23% 0.6	2% 0.62	% 4.32%	2.47%	1.54% 1	.23% 1.	85% 0.9	93% 0.00	%	
PARENTING	-0.00%	0.77% 0	.51% 2.0	05% 0.2	6% 1.53%	6 1.28% 2	2.30% 2.05	% 1.28%	4.09%	3.07% 4.0	9% 1.79	% 3.58%	1.28% 1	53%50	0.13% <mark>1</mark> /	02% 1.0	2% 0.77	% 0.26%	0.77% 2.	.05% 1.0	2% 1.28	% 1.28%	6 0.51%	0.77%]	.02% 3.	07% 3.0	07% 0.51	%	
POLITICS	-2.14%	5.00% 0	.24% 2.6	52% 3.3	3% 0.95%	6 0.24% 1	1.19% 1.19	% 2.62%	1.19%	0.48% 2.0	52% 0.24	% 1.90%	4.76% 2.	.38% 0).48% <mark>17</mark>	.62% <mark>1.6</mark>	7% 2.8€	% 0.24%	1.67% 1.	67% 0.2	4% 0.24	% 0.95%	0.48%	0.00% (0.71% 0.	48%2.1	36% 4.76	%	
QUEER VOICES	-1.93%	0.48% 0	.48% 0.4	\$8% 1.2	0% 2.65%	6 0.72% (0.48% 2.17	% 0.24%	0.96%	0.00% 2.3	17% 0.48	% 1.69%	1.20% 0.	.00% 2	.41%2.	17%55.3	30% <mark>0.7</mark> 2	% 0.00%	2.17% 1.	45% 0.0	0% 0.72	% 0.48%	6 0.48%	2.17% 0	0.96% 1.	69% 1.4	45% 0.48	%	
RELIGION	-1.59%	2.05% 0	.45% 0.9	91% 1.1	4% 2.27%	% 0.00% (0.45% 0.68	% 0.23%	1.36%	2.05% 2.1	73% 0.45	% 1.82%	1.14% 0.	23% 2	.73% 3.	18% 2.2	7% <mark>58.8</mark>	5 <mark>%</mark> 0.68%	0.68% 0.	91% 0.2	3% 0.23	% 0.45%	0.68%	1.14% (0.91% 1.	59% 1.	82% 4.09	%	
SCIENCE	-0.00%	0.72% 0	.24% 0.4	18% 0.2	4% 1.219	6 0.00% (0.24% 0.72	% 5.07%	1.45%	0.72% 5.8	30% 1.69	% 0.72%	0.24% 0.	72% 3	.86% 0.	97% 0.0	0% 0.48	<mark>%</mark> 59.90%	1.21% 1.	21% 0.0	0% 1.45	% 0.72%	0.72%	0.24%2	.90% 5.	07% 0.3	72% 0.24	%	
SPORTS	-0.98%	0.73% 0	.49% 2.2	20% 1.2	2% 0.98%	6 0.00% (0.24% 0.49	% 0.73%	0.24%	1.46% 1.3	71% 0.24	% 1.46%	1.22% 0.	00% 0	0.98% 1.	22% 0.9	8% 0.73	% 0.49%	2.20%0.	73% 0.7	3% 0.49	% 0.49%	6 0.98%	0.73% 1	.22% 0.	49% 1.	71% 1.46	%	
STYLE	-1.21%	0.97% 0	.00% 3.3	39% 0.2	4% 0.97%	6 0.73% (0.00% 3.87	% 0.73%	1.21%	0.73% 1.0	59% 1.94	% 0.97%	1.21% 0.	24% 1	.45% 0.	97% 0.4	8% 0.00	% 0.97%	1.69%55	.69% <mark>9.</mark> 9	3% 1.459	% 1.45%	6 0.97%	1.21% (0.73% 0.	00%2.	91% 0.00	%	
STYLE & BEAUTY	-0.51%	0.51% 0	.26% 0.0	00% 0.0	1.289	% 0.26% (0.26% 2.56	% 0.00%	0.51%	0.00% 1.0	2% 2.81	% 0.00%	0.51% 0.	51% 0	0.51% 0.	00% 0.2	6% 0.2€	% 0.26%	1.02%15	.60%5.	22%0.77	% 0.77%	5 1.28%	0.51% 0	0.00% 1.	02% 1.3	28% 0.26	%	
TASTE	-0.50%	1.51% 0	.25% 1.2	26% 0.0	0% 0.76%	6 0.00% (0.00% 1.26	% 0.76%	1.76%	1.01% 3.2	27% 2.52	% 1.01%	0.00% 0.	00% 1	.51% 0.	00% 0.0	0% 0.7€	% 0.76%	1.51% 1.	76% 0.5	0% <mark>71.28</mark>	<mark>%0.25</mark> %	2.02%	0.50%2	.02% 0.	76% 0.:	25% 0.25	%	
TECH	-0.48%	5.53% 0	.24% 0.7	72% 0.0	0% 0.48%	6 0.00% (0.24% 0.48	% 0.00%	1.20%	D.48% 1.6	58% 0.24	% 0.24%	2.16% 1	92% 3	.12% 1.	20% 0.0	0% 0.72	%2.40%	0.72% 0.	96% 0.2	4% 0.24	%56.35°	0.96%	0.72%2	.16% 0.	96% 0.	72% 2.40	%	
TRAVEL	-0.25%	1.48% 0	.49% 0.9	99% 0.7	4% 2.72%	6 0.00% (0.00% 0.99	% 1.73%	0.99%	D.00% 2.4	47%2.96	% 1.23%	0.25% 0.	99% 2	.72% 0.	25% 0.2	5% 0.74	%2.22%	0.99% 1.	98% 0.9	9% 5.19	% 0.74%	50.00%	0.74% 1	.48% 1.	23% 0.4	¥9% 1.73	%	
WEDDINGS	-0.00%	0.00% 0	.50% 0.5	50% 0.2	5% 0.75%	% 4.50% (0.00% 1.25	% 0.00%	1.75%	0.75% 0.	75% 2.00	% 0.25%	0.00% 1	.00% 2	.25% 0.	25% 1.2	5% 0.25	% 0.00%	0.50% 0.	75% 1.7	5% 0.25°	% 0.50%	5 1.00%	75.25%	0.25% 0.	75% 0.	75% 0.00	%	
WEIRD NEWS	-0.49%	0.74% 0	.00% 4.9	90% 5.8	8% 1.72%	6 0.74% (0.00% 2.70	% 4.66%	1.47%	5.39% 2.3	21% 1.47	% 0.98%	0.98% 0.	74% 1	.47% 0.	98% 0.4	9% 0.98	% 2.70%	2.45% 4.	17% 0.0	0% 3.929	% 5.88%	1.72%	0.25%	8.24% <mark>0</mark> .	25% 0.	74% 0.74	%	
WELLNESS	-0.49%	1.97% 0	.25% 1.7	72% 0.4	9% 0.74%	% 1.97% (0.74% 0.49	% 1.97%	2.21%	0.74%20.	88%0.98	% 2.95%	0.25% 0.	98% 4	1.67% 0.	25% 0.7	4% 0.98	% 4.42%	0.74% 0.	25% 0.9	8% 4.42	% 1.97%	6 0.74%	0.49% (.98%35	.63%2.	95% 0.00	%	
WOMEN	-2.25%	1.75% 2	.00%2.0	0% 0.5	0% 1.00%	% 1.25% (0.25% 2.75	% 0.50%	3.75%	1.00% 8.0	00% 1.00	% 2.00%	2.00% 1	.00% 2	.75% 2.	00% 1.7	5% 1.50	% 0.25%	1.50% 3.	25% 1.7	5% 1.00	% 2.25%	0.50%	1.00% (0.75% 3.	25% 42	75% <mark>0.75</mark>	%	
WORLD	-1.24%	1.73% 0	.99% 0.7	74% 2.7	2% 0.74%	6 0.25% (0.00% 0.00	% 3.47%	0.25%	0.50% 1.2	24% 0.25	% 3.47%	1.98% 0.	50% 0	0.25% 6.	44% 0.0	0% 4.46	% 0.74%	1.73% 0.	25% 0.0	0% 0.25	% 2.97%	2.72%	0.25%2	.97% 0.	25% 0.	74%55.94	96	
	DICES -	VESS -	- BOBL	RIMF -	ARTS -	ORCE -	TION -	AENT -	FIFTY -	tews -	- SNIN	PACT -	EDIA -	- Yang	- DNIT	TICS -	SION -	ENCE -	ORTS -	- TYLE -	ASTE -	TECH -	AVEL -	- SONI	- swar	NESS -	MEN -		
	ACK VC	BUSII	COL	8 0	URE & .	DIVIC	EDUCA	VIRONN	_	000 V	אב גע רו	IMI	Σ	MC	PAREN	POL	RELIC	SCIE	Š		4 4		TR	WEDD	/EIRD N	WELL	WC WC		
	BL				CULT		ENTE	EN)			HEA HON					2	2			Ē	5				\$				

News -	TF-I	DF	Bigrams
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Epochs: 5, Batch Size: 64

Accuracy: 0.3947 F1-Score: 0.4067

- 1. Weddings: 0.6484
- 2. Divorce: 0.5826
- 3. Sports: 0.5777

	precision	recall	f1-score	support
BLACK VOICES	0.3776	0.4719	0,4195	392
BUSINESS	0.3394	0.2921	0.3140	380
COLLEGE	0.4381	0.4009	0.4187	212
COMEDY	0.2951	0.4637	0.3606	399
CRIME	0.4526	0.5134	0.4811	409
CULTURE & ARTS	0.5362	0.3744	0.4409	673
DIVORCE	0.6400	0.5346	0.5826	419
EDUCATION	0.4145	0.3182	0.3600	198
ENTERTAINMENT	0.3226	0.3618	0.3410	387
ENVIRONMENT	0.4116	0.4000	0.4057	355
FIFTY	0.2500	0.2125	0.2297	273
GOOD NEWS	0.2554	0.2721	0.2635	305
HEALTHY LIVING	0.1118	0.5233	0.1843	386
HOME & LIVING	0.6394	0.5466	0.5894	386
IMPACT	0.2484	0.2900	0.2676	400
MEDIA	0.5332	0.5089	0.5207	395
MONEY	0.4693	0.4475	0.4581	324
PARENTING	0.3112	0.2276	0.2629	391
POLITICS	0.4260	0.3429	0.3799	420
QUEER VOICES	0.5565	0.4867	0.5193	415
RELIGION	0.4448	0.3386	0.3845	440
SCIENCE	0.6091	0.3575	0.4505	414
SPORTS	0.6543	0.5171	0.5777	410
STYLE	0.2967	0.4116	0.3448	413
STYLE & BEAUTY	0.6453	0.4885	0.5560	391
TASTE	0.4688	0.4912	0.4797	397
TECH	0.5627	0.4423	0.4953	416
TRAVEL	0.5660	0.2963	0.3890	405
WEDDINGS	0.7195	0.5900	0.6484	400
WEIRD NEWS	0.2500	0.1814	0.2102	408
WELLNESS	0.4717	0.1229	0.1949	407
WOMEN	0.3390	0.2500	0.2878	400
WORLD	0.4755	0.4554	0.4652	404
accuracy			0.3947	12824
macro avg	0.4404	0.3919	0.4025	12824
weighted avg	0.4471	0.3947	0.4067	12824

Confusion Matrix

- 0.5

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

BLACK VOICES	47.19%	0.51% 1	.02% 2	.81% 5.	10% 1.5	3% 0.26%	1.79% 6.	38% 1.	02% 0.77	% 1.79%	4.85%	0.00% 2	.30% 2	2.30% 0	0.51% 0	0.51% 2	.30% 2.0	04% 2.30%	6 0.00% 5	.10% 2.	55% 0.7	7% 0.51	% 0.26%	0.26% 0	.26% 1.	02% 0.:	26% 1.0	2% 0.77%	
BUSINESS	-2.89%	9.21% <mark>1</mark>	.58% 2	.89% 0	.79% 0.7	9% 0.26%	1.05% 0.	26% 1.	84% 1.84	% 0.53%	16.58%	0.79% 3	.95% 3	3.68% 8	.16% 1	.05% 2	.37% 1.3	32% 0.79%	6 1.05% 0	.26% 0.5	53% 0.2	6% 2.63	% 5.53%	0.53% 0	.79% 1.	32% 0.	00% 2.3	7%2.11%	
COLLEGE	1.89%	0.94%	0.09% <mark>3</mark>	.77% 3.	77% 1.4	2% 0.00%	4.72% 1.	89% 0.	94% 1.42	% 1.89%	12.74%	0.00% 2	.36% 1	L.42% 3	.77% 0	0.47% 1	.89% 1.4	42% 1.89%	6 0.47% 1	.89% 0.9	94% 0.0	0% 0.00	% 0.94%	0.00% 0	.47% 0.	00% 0.	00% 5.1	9% 1.42%	
COMEDY	2.26%	0.75% 0	.75%	5.37% <mark>0</mark> .	.25% 0.7	5% 1.00%	0.25% 5.	76% 1.	75% 1.00	% 1.00%	10.28%	0.75% 2	.01%2	2.26% 0	0.50% 1	.25% 5	.01% 1.5	50% 1.50%	6 1.00% 1	.00% 2.	76% 0.2	5% 2.26	% 0.50%	0.50% 1	.00% 1	00% 0.	00% 1.7	5% 1.00%	
CRIME	8.31%	0.49% 1	.22% 0	0.73% <mark>51</mark>	34% <mark>0.</mark> 9	8% 0.73%	0.24% 1.	47%1.	47% 0.49	% 2.93%	8.56%	0.49% 1	.22% (0.73% 0	0.49% 0	0.49% 0	.73% 1.4	47% 1.22%	6 0.00% 0	.24% 1.3	22% 0.0	0% 0.73	% 0.24%	0.73% 0	.24% 5.	B7% 0.	00% 1.4	7% 3.42%	
CULTURE & ARTS	3.42%	1.04% 0	.45% 4	.46% 0.	.59%37.4	4%0.45%	0.30% 5.	35% 1.	63% 1.34	% 2.38%	12.48%	1.04% 1	78%]	L.93% 0	0.89% 2	.08% 1	.34% 1.7	78% 1.49%	6 1.19% 0	.45% 3.5	57% 1.3	4% 2.08	% 0.89%	1.34% 0	.30% 1.	63% 0.:	30% 2.2	3% 1.04%	
DIVORCE	1.43%	0.95% 0	0.72% 2	.15% 0.	.48% 0.2	4%53.46%	0.24%2.	86% 0.	24% 3.82	% 0.24%	9.79%	0.72% 1	.91% (0.24% 1	.67% 4	k. 30% 0	.24% 1.1	19% 0.95%	60.24% 0	.48% 1.4	43% 0.9	5% 1.67	% 0.48%	0.48% 3	.82% 1.	43% 0.0	00% 1.1	9% 0.00%	
EDUCATION	3.03%	3.03% 8	.08% 3	.03% 1.	.52% 3.0	3% 0.00%	81.82% <mark>0</mark> .	51% 0.	.00% 1.52	% 1.52%	13.64%	0.51% 6	i.57% 1	L.52% 1	.52% 3	.03% 3	.03% 0.5	51% 1.01%	6 0.00% 1	.01% 0.	51% 0.0	0% 3.03	% 1.52%	1.01% 0	.00% 0.	00% 0.	51% 1.0	1% 3.03%	
ENTERTAINMENT	6.46%	0.52% 0	.52%10	0.08%1.	.29% 4.1	3% 1.03%	0.26%36	.18% <mark>0</mark>	52% 1.29	% 1.29%	6.72%	0.26% 0	0.52% 1	L.55% 0	0.26% 1	.81% 1	.81% 1.8	81% 0.78%	60.52%1	.55% 8.:	27% 1.5	5% 2.07	% 1.03%	0.78% 0	.78% 0.	78% 0.	0% 2.5	3% 1.03%	
ENVIRONMENT	0.56%	1.97% 0	.28% 3	.66% 1.	.69% 2.2	5% 0.56%	0.56% 1.	13%40	.00%0.56	% 5.92%	10.70%	1.13% 3	.94% 1	L.97% 0	0.85% 1	.69% 1	.41% 1.1	13% 2.54%	63.10% 1	.13% 1.:	13% 0.2	8% 1.13	% 0.56%	1.13% 0	.00% 2.	82% 0.:	56% 0.2	3% 3.38%	
FIFTY	2.20%	0.73% 0	.37% 3	.30% 1.	.47% 1.1	0% 2.56%	0.73% 1.	83% 0.	37%21.25	% 2.93%	24.54%	0.73% 3	.30% (0.73% 5	.13% 4	.76% 0	.37% 1.1	10% 1.479	6 1.47% 0	.37% 4.0	0.3% 0.3	7% 0.73	% 1.10%	1.47% 1	.10% 2.	20% 1.4	7% 4.0	3% 0.73%	
GOOD NEWS	-2.95%	2.30% 0	.33% 3	.93% 3.	.28% 2.3	0% 0.33%	0.66% 0.	98% 4	92% 1.31	%27.219	14.43%	1.31% 7	.21% 1	L.64% 0	0.33% 3	.93% 0	.66% 1.9	97% 1.97%	6 1.31% 1	.97% 1.9	97% 0.0	0% 1.64	% 0.66%	0.66% 0	.66% 6.	23% 0.	00% 0.6	5% 0.33%	
HEALTHY LIVING	0.78%	1.55% 0	.26% 2	.33% 1.	.04% 2.0	7% 1.81%	0.78% 0.	52% 1.	55% 3.37	% 0.52%	52.33%	0.26% 3	.89% (0.52% 1	.55% 1	30% 0	.78% 1.3	30% 2.33%	62.59% 0	.78% 3.:	37% 0.5	2% 2.59	% 0.00%	0.26% 0	.26% 0.	26% 5.:	8% 2.5	9% 0.78%	
HOME & LIVING	0.78%	1.55% 0	.26% 2	.59% 0.	.78% 2.3	3% 2.07%	0.00% 1.	55% 1.	04% 1.30	% 0.26%	6.74%	54.66%1	.04% (0.00% 1	.81% 1	30% 0	.00% 0.5	52% 0.52%	6 0.26% 0	.26% 4.4	10% 2.5	9% 5.44	% 1.30%	1.55% 0	.26% 1.	55% 0.3	26% 0.7	3% 0.26%	
IMPACT	-3.00%	2.25% 1	.25% 2	.75% 1.	.50% 2.0	0% 1.25%	1.75% 0.	75% 3.	00% 1.25	% 4.25%	16.00%	0.50%	9.00% <mark>(</mark>	0.50% 2	.25% 2	.25% 2	.00% 1.7	75% 3.25%	6 0.25% 1	.75% 3.3	75% 0.0	0% 0.75	% 1.50%	0.25% 0	.00% 1.	00% 1.0	00% 3.5	0% 3.75%	
MEDIA	1.77%	1.27% 0	.00% 9	.62% 2.	.03% 1.0	1% 0.25%	0.76% 1.	77% 0.	76% 0.00	% 0.25%	6.08%	0.00% 1	.27%5	0.89%0	0.00% 0	0.51% 7	.34% 0.7	76% 3.80%	6 0.25% 0	.25% 1.3	27% 0.5	1% 0.00	% 1.52%	0.00% 0	.25% 0.	76% 0.:	51% 0.7	5% 3.80%	
MONEY	-1.85%	8.02%2	.16% 0	0.93% 2.	.16% 0.6	2% 0.93%	0.93% 0.	31% 0	93% 1.23	% 1.54%	12.04%	2.47% 4	k.01% C	0.62%	4.75%1	.23% 0	.62% 1.2	23% 0.31%	60.31%0	.31% 0.9	93% 0.0	0% 1.23	% 2.16%	1.85% 1	.85% 0.	93% 0.	0% 0.9	3% 0.62%	
PARENTING	2.56%	2.05% 1	.53% 2	.81% 4.	.09% 2.3	0% 2.05%	2.30% 3.	07% 0.	26% 4.09	% 5.37%	18.16%	1.28% 3	.58% (0.26% 1	.02%2	2.76%0	.26% 2.3	30% 1.02%	6 0.77% 0	.26% 3.5	58% 0.5	1% 2.30	% 1.02%	0.51% 1	.28% 2.	05% 1.3	8% 3.0	7% 0.26%	
POLITICS	4.29%	3.10% 0	.95% 9	0.76% 1.	.67% 1.9	0% 0.24%	1.19% 0.	48% 2.	86% 0.24	% 1.19%	10.00%	0.24% 3	.33% 6	5.19% 0	0.95% 0	0.00%34	.29% <mark>2.</mark> 8	86% 2.62%	6 0.00% 1	.43% 0.3	71% 0.2	4% 0.71	% 1.19%	0.00% 0	.24% 0.	71% 0.	00% 1.9	0% 4.52%	
QUEER VOICES	-2.65%	0.48% 1	.69% 4	.58% 0.	.96%2.4	1% 0.48%	0.48% 3.	13% 0.	48% 0.72	% 2.17%	8.43%	0.96% 4	.34%]	L.20% 0	0.00% 1	93% 2	.41% 18.	67%2.65%	60.24% 0	.48% 2.	17% 0.2	4% 0.48	% 0.48%	0.00% 2	.17% 0.	48% 0.4	18% 0.9	5% 0.96%	
RELIGION	-3.86%	0.91% 1	.14% 3	.86% 2.	.50% 1.5	9% 0.68%	0.23%2.	05% 2.	27% 0.45	% 0.91%	17.73%	0.45% 4	1.55% 1	L.59% 0	0.91% 0	0.91% 2	.50% 2.7	7 3% 33.869	0.91% 0	.45% 1.	59% 0.0	0% 1.14	% 0.91%	0.91% 0	.45% 1.	14% 0.	00% 1.8	2% 5.00%	
SCIENCE	0.24%	1.69% 0	.24% 1	21% 1.	.69% 2.1	7% 0.24%	0.48% 1.	93% 8	21% 0.72	% 1.69%	19.32%	0.97% 2	.17% (0.72% 1	.21% 1	21% 0	.72% 1.6	59% 0.97%	635.75%1	.21% 2.	17% 0.0	0% 1.21	% 2.66%	0.97% 0	.72%2.	90% 0.	97% 0.4	3% 1.45%	
SPORTS	3.66%	1.22% 0	.73% 4	.15% 3.	.41% 0.4	9% 0.24%	0.49% 1.	22% 0.	49% 0.00	% 2.20%	10.98%	0.24% 1	.22% 1	L.22% 0	0.49% 0	0.73% 0	.98% 1.2	22% 1.22%	6 0.24%5	1.71% <mark>1</mark> .	71% 0.2	4% 0.49	% 0.73%	0.49% 0	.98% 3.	17% 0.	00% 1.7	L% 1.95%	
STYLE	2.66%	1.45% 0	.00% 2	.42% 0.	.24% 1.6	9% 0.73%	0.00%6.	54% 0.	97% 0.97	% 1.69%	11.86%	1.94% 0	0.97%]	L.45% 0	0.24% 0	0.97% 1	.21% 0.7	73% 0.00%	6 0.24% 0	.97%41.	16% <mark>7.9</mark>	9% 2.42	% 1.94%	0.48% 0	.48%2.	42% 0.:	24% 2.4	2% 0.48%	
STYLE & BEAUTY	1.02%	0.77% 0	1.00% 0	0.77% 0.	.51% 1.5	3% 1.28%	0.51% 3.	07% 0.	51% 1.02	% 1.02%	5.37%	2.81% 0	0.77% (0.00% 0	0.77% 0	0.00% 0	.51% 0.2	26% 0.26%	6 0.26% 0	.00%23.	27%18.8	35%0.51	% 0.26%	1.02% 1	.02% 0.	77% 0.:	26% 0.7	7% 0.26%	
TASTE	1.76%	1.01% 0	0.00% 3	.02% 1.	26% 2.5	2% 0.50%	0.50% 0.	76% 1.	01% 1.76	% 2.02%	11.59%	2.77% 2	.52% (0.00% 0	0.25% 1	.76% 0	.25% 0.2	25% 1.01%	6 0.00% 0	.50% 3.2	27% 1.0	1% 49.12	%1.51%	1.76% 0	.25% 3.	27% 0.:	25% 1.5	L% 1.01%	
TECH	0.72%	4.81% 0	.48% 2	.40% 0.	.96% 1.9	2% 1.44%	0.96% 1.	44% 1.	20% 0.48	% 0.96%	11.06%	0.72% 1	.92% 2	2.64%2	.40% 1	.92% 1	.68% 0.4	48% 0.72%	61.68% 0	.48% 1.0	58% 0.4	8% 2.16	%44.23%	0.24% 0	.48%2.	88% 0.(00% 0.7	2% 3.61%	
TRAVEL	1.23%	3.21% 0	1.99% 3	.46% 2.	.47% 4.9	4% 0.74%	0.00% 0.	74% 3.	95% 1.98	% 1.23%	13.33%	3.95% 3	.46% 0	0.99% 1	.73% 1	98% 0	.25% 0.7	74% 0.74%	6 0.00% 0	.74% 1.3	73% 1.4	8% 6.67	% 1.48%	29.63% <mark>1</mark>	.48% 2.	22% 0.:	25% 0.4	9% 1.73%	
WEDDINGS	0.25%	0.75% 0	0.25% 2	.25% 0.	.75% 1.5	0% 4.25%	0.50% 4.	00% 0	.00% 2.50	% 1.75%	6.25%	1.00% 1	.75% (0.25% 0	0.25% 1	.00% 0	.00% 0.5	50% 0.75%	6 0.25% 0	.50% 3.2	25% 1.5	0% 1.75	% 0.50%	0.75%5	9.00% <mark>0</mark> .	50% 0.	50% 0.7	5% 0.25%	
WEIRD NEWS	0.98%	0.98% 0	.49% 4	.17%12	.25%1.7	2% 1.72%	0.25% 3.	43% 2.	94% 0.74	% 6.62%	15.93%	0.74% 2	.94% 1	L.96% 1	.96% 2	.21% 1	.23% 0.0	00% 1.47%	6 1.47% 0	.74% 4.0	56% 0.4	9% 4.17	% 1.47%	0.74% 0	.98%18	.14%0.	00% 0.4	9% 1.96%	
WELLNESS	0.98%	2.21% 1	.23% 1	.72% 0.	.74% 1.2	3% 1.97%	1.23% 1.	72% 0.	98%2.46	% 2.21%	42.51%	0.74% 4	k.91% C	0.49% 2	.46% 1	.97% 0	.25% 0.4	\$9% 1.23%	6 2.70% 0	.00% 2.4	46% 0.2	5% 2.70	% 0.74%	1.97% 0	.49% 1.	23%12.	29%0.9	3% 0.49%	
WOMEN	5.00%	2.25% 1	.75% 4	.50% 2.	.50% 2.0	0% 2.00%	0.25% 4.	00% 0	75% 3.75	% 0.50%	14.00%	0.25% 4	.75% 2	2.50% 0	0.00% 2	.50% 2	.75% 3.0	00% 1.00%	6 0.50% 1	.75% 5.3	75% 1.0	0% 0.75	% 1.00%	0.25% 0	.50%2.	25% 0.:	50%25.0	<mark>0%</mark> 0.75%	
WORLD	1.98%	2.48% 0	0.74% 2	.48% 3.	.22% 1.2	4% 0.25%	0.50% 0.	50% 1.	98% 0.25	% 1.24%	13.12%	0.25% 3	.71% 1	L.49% 0	0.50% 0	0.99% 3	.47% 0.7	74% 4.219	6 0.99% 1	.49% 0.9	99% 0.5	0% 0.25	% 1.24%	0.74% 0	.00% 1.	73% 0.0	00% 1.2	1% 45.54%	
	K VOICES .	BUSINESS -	COLLEGE .	COMEDY -	CRIME.	DIVORCE -	UCATION -	AINMENT	CONMENT -	OD NEWS -	HY LIVING .	& LIVING .	IMPACT .	MEDIA .	MONEY -	RENTING .	POLITICS	R VOICES	SCIENCE -	SPORTS	STYLE .	TASTE -	TECH.	TRAVEL -	EDDINGS .	RD NEWS	VELLINESS -	WORLD .	
	BLAC						Ξ	ENTERI	ENVIE	60	HEALTI	HOME				đ.		quee							*	MEI	~		

Labels

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	precision	recall	f1-score	support
BLACK VOICES	0.1311	0.0893	0.1062	392
BUSINESS	0.2167	0.0342	0.0591	380
COLLEGE	0.1786	0.0236	0.0417	212
COMEDY	0.2853	0.2481	0.2654	399
CRIME	0.3097	0.5134	0.3864	409
CULTURE & ARTS	0.2143	0.2675	0.2379	673
DIVORCE	0.2570	0.3699	0.3033	419
EDUCATION	0.1111	0.0202	0.0342	198
ENTERTAINMENT	0.2061	0.2093	0.2077	387
ENVIRONMENT	0.2038	0.0901	0.1250	355
FIFTY	0.2029	0.3590	0.2593	273
GOOD NEWS	0.3214	0.2066	0.2515	305
HEALTHY LIVING	0.1534	0.1244	0.1373	386
HOME & LIVING	0.3927	0.3886	0.3906	386
IMPACT	0.1598	0.1950	0.1757	400
MEDIA	0.2305	0.1797	0.2020	395
MONEY	0.1623	0.3086	0.2128	324
PARENTING	0.1742	0.1969	0.1849	391
POLITICS	0.2379	0.3381	0.2793	420
QUEER VOICES	0.1309	0.0602	0.0825	415
RELIGION	0.2321	0.1477	0.1806	440
SCIENCE	0.2254	0.1546	0.1834	414
SPORTS	0.1509	0.0854	0.1090	410
STYLE	0.2706	0.4140	0.3273	413
STYLE & BEAUTY	0.4092	0.4552	0.4310	391
TASTE	0.2627	0.2872	0.2744	397
TECH	0.2531	0.2428	0.2479	416
TRAVEL	0.2784	0.2667	0.2724	405
WEDDINGS	0.3286	0.3475	0.3378	400
WEIRD NEWS	0.1737	0.2010	0.1864	408
WELLNESS	0.1803	0.2113	0.1946	407
WOMEN	0.1639	0.1475	0.1553	400
WORLD	0.2161	0.3119	0.2553	404
accuracy			0.2335	12824
macro avg	0.2250	0.2271	0.2151	12824
weighted avg	0.2271	0.2335	0.2208	12824

News - Word2Vec

Epochs: 20, Batch Size: 64, Window: 5

Accuracy: 0.2335 F1-Score: 0.2208

- 1. Home & Living: 0.3906
- 2. Crime: 0.3864
- 3. Weddings: 0.3378

Confusion Matrix for Dense Embeddings

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

BLACK VOICES -8.93% 0.26% 0.26% 0.26% 3.06% 10.71%5.87% 4.34% 0.26% 7.65% 1.02% 1.02% 1.02% 1.02% 0.51% 0.00% 4.34% 6.63% 1.53% 2.04% 5.10% 2.30% 2.55% 2.04% 1.79% 2.55% 0.51% 2.04% 0.26% 1.02% 1.79% 1.02% 7.40% 7.40% 7.40% BUSINESS -1.84% 3.42% 0.00% 0.53% 1.84% 7.37% 3.68% 1.32% 0.79% 2.37% 3.42% 0.26% 4.74% 0.26% 5.79% 3.16% 13.95% 2.37% 5.53% 0.26% 1.84% 2.37% 2.89% 1.32% 0.79% 2.11% 6.84% 2.37% 0.53% 1.58% 6.05% 2.89% 5.53% COLLEGE -2.36% 1.42% 2.36% 9.43% 3.77% 4.25% 0.94% 2.36% 1.89% 3.30% 1.42% 3.77% 0.00% 12.26% 0.94% 6.60% 1.89% 8.49% 0.00% 6.13% 0.94% 2.83% 1.42% 0.00% 0.00% 1.42% 2.36% 1.42% 2.36% 3.77% 2.36% 5.19% COMEDY -2 26% 0.00% 0.25% 24.81% 2.26% 4.26% 0.50% 0.00% 8.02% 0.50% 3.76% 1.00% 2.26% 2.51% 0.25% 2.76% 0.50% 2.51% 8.02% 1.75% 1.75% 1.00% 2.01% 6.77% 4.26% 1.75% 1.75% 2.26% 2.01% 6.52% 0.50% 2.01% 0.25% CRIME -3.18% 0.00% 0.49% 0.98% 1.34% 2.93% 2.20% 0.00% 2.69% 0.98% 1.22% 1.96% 0.73% 0.24% 0.73% 2.69% 0.00% 2.44% 2.44% 1.47% 2.20% 1.47% 0.98% 0.24% 0.00% 0.98% 0.24% 1.22% 3.91% 0.49% 0.49% 0.36% CULTURE & ARTS -2.23% 0.15% 0.00% 2.53% 2.23% 2.675% 1.34% 0.45% 5.94% 0.74% 1.93% 1.04% 1.19% 1.78% 1.93% 0.74% 1.04% 1.93% 1.78% 1.49% 2.97% 2.82% 1.34% 7.88% 3.57% 2.23% 2.82% 4.61% 1.78% 4.46% 1.78% 3.86% 2.67% DIVORCE -0 95% 0.00% 0.00% 0.24% 2.39% 1.91% 1.91% 0.00% 1.19% 0.24% 6.92% 0.48% 1.91% 1.91% 1.91% 1.67% 0.00% 5.97% 8.83% 0.24% 2.15% 0.48% 1.43% 0.00% 0.00% 1.91% 2.86% 0.95% 2.63% 9.31% 0.72% 4.30% 1.19% 0.24% EDUCATION -1.52% 1.01% 1.01% 0.51% 1.52% 4.04% 5.05% 2.02% 0.51% 3.54% 1.52% 0.51% 3.54% 0.00% 17.17% 1.52% 1.62% 6.06% 8.08% 2.02% 2.02% 0.51% 0.01% 0.51% 0.51% 1.52% 2.53% 0.00% 0.00% 1.01% 9.09% 5.05% 4.55% ENTERTAINMENT -2.84% 0.00% 0.00% 4.39% 5.94%13.18%0.78% 0.00%20.93%0.00% 1.03% 2.58% 0.52% 0.52% 1.03% 3.36% 0.52% 0.00% 3.36% 3.10% 1.03% 2.33% 1.55%10.34%2.07% 0.78% 2.33% 1.03% 1.29% 8.01% 1.03% 2.07% 2.07% ENVIRONMENT - 1.13% 0.85% 0.00% 0.28% 5.63% 8.45% 3.10% 0.28% 1.41% 9.01% 1.69% 0.85% 2.82% 2.54% 8.45% 3.10% 5.07% 1.13% 3.38% 0.56% 2.54% 5.63% 1.69% 3.38% 1.13% 1.41% 3.38% 3.94% 1.41% 9.01% 1.69% 0.85% 2.82% 2.54% 8.45% 3.10% 5.07% 1.13% 3.38% 0.56% 2.54% 5.63% 1.61% 3.38% 3.94% 1.41% 9.01% 1.69% 0.85% 2.82% 2.54% 8.45% 3.10% 5.07% 1.13% 3.38% 0.56% 2.54% 5.63% 1.69% 3.38% 3.94% 1.41% 9.01% 1.69% 0.85% 2.82% 2.54% 8.45% 3.10% 5.07% 1.13% 3.38% 0.56% 2.54% 5.63% 1.69% 3.38% 3.94% 1.41% 9.01% 1.69% 0.85% 2.82% 2.54% 8.45% 3.10% 5.07% 1.13% 3.38% 0.56% 2.54% 5.63% 1.41% 9.13% 2.44% 1.41% 3.28% 2.54% 1.41% 3.28% 2.54% 3.10% 5.07% 3.13% 3.28% 3.54% 3.28% 2.54% 3.56% 2.54% 3.28% 2.54% 3.28% 2.54% 3.50% 3.50% 2.54% 3.58% 3.56% 2.54% 3.58% 3.56% 2.54% 3.58% 3.56% 2.54% 3.58% 3.56% 2.54% 3.58% 3.56% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 3.58% 2.54% 2.54% 2.54% 2.54% 2.54% 2.54% 2.54\% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58% 2.58\% 2.58 FFTY - 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	precision	recall	f1-score	support
BLACK VOICES	0.1515	0.0765	0.1017	392
BUSINESS	0.1633	0.0421	0.0669	380
COLLEGE	0.1905	0.0189	0.0343	212
COMEDY	0.2350	0.2456	0.2402	399
CRIME	0.3014	0.5452	0.3882	409
CULTURE & ARTS	0.2335	0.2630	0.2474	673
DIVORCE	0.2730	0.3890	0.3209	419
EDUCATION	0.1809	0.0859	0.1164	198
ENTERTAINMENT	0.2118	0.2326	0.2217	387
ENVIRONMENT	0.1548	0.0732	0.0994	355
FIFTY	0.2000	0.3700	0.2596	273
GOOD NEWS	0.2755	0.2393	0.2561	305
HEALTHY LIVING	0.1611	0.1373	0.1483	386
HOME & LIVING	0.3956	0.4223	0.4085	386
IMPACT	0.1471	0.1850	0.1639	400
MEDIA	0.2185	0.1975	0.2074	395
MONEY	0.1633	0.2963	0.2105	324
PARENTING	0.1676	0.1509	0.1588	391
POLITICS	0.2500	0.3429	0.2892	420
QUEER VOICES	0.1538	0.0578	0.0841	415
RELIGION	0.1914	0.1523	0.1696	440
SCIENCE	0.2132	0.1014	0.1375	414
SPORTS	0.1699	0.0854	0.1136	410
STYLE	0.2917	0.3850	0.3319	413
STYLE & BEAUTY	0.4304	0.5217	0.4717	391
TASTE	0.2816	0.3476	0.3112	397
TECH	0.2574	0.2909	0.2731	416
TRAVEL	0.2544	0.2494	0.2519	405
WEDDINGS	0.3761	0.3300	0.3515	400
WEIRD NEWS	0.1765	0.1250	0.1463	408
WELLNESS	0.2126	0.2899	0.2453	407
WOMEN	0.1871	0.1600	0.1725	400
WORLD	0.2053	0.3045	0.2453	404
accuracy			0.2389	12824
macro avg	0.2265	0.2338	0.2195	12824
weighted avg	0.2284	0.2389	0.2244	12824

News - Word2Vec Epochs: 20, Batch Size: 64, Window: 10

Accuracy: 0.2389 F1-Score: 0.2244

- 1. Style & Beauty: 0.4717
- 2. Home & Living: 0.4085
- 3. Weddings: 0.3515

Confusion Matrix for Dense Embeddings

- 0.4

- 0.3

- 0.2

-01

- 0.0

BLACK VOICES -7.65% 0.00% 0.00% 3.57% 13.27% 6.12% 2.55% 0.51% 8.42% 1.02% 1.02% 2.55% 0.77% 0.51% 4.59% 6.38% 1.79% 1.79% 1.59% 2.55% 4.59% 1.02% 1.79% 0.26% 2.81% 1.02% 2.81% 1.28% 0.26% 0.26% 0.51% 6.38% 7.40% BUSINESS -1.84% 4.21% 0.00% 0.79% 2.11% 7.37% 3.42% 1.58% 0.79% 3.68% 1.05% 0.79% 4.74% 0.53% 5.00% 3.42% 12.11% 2.37% 5.79% 0.79% 2.37% 0.53% 1.84% 1.84% 0.79% 1.32% 7.89% 0.26% 1.32% 7.63% 2.11% 6.84% COLLEGE -1.89% 2.36% 1.89% 1.89% 1.85% 2.83% 3.77% 3.77% 1.89% 1.42% 4.72% 0.47% 4.25% 0.00% 11.79% 1.42% 6.13% 1.89% 8.49% 0.47% 5.66% 0.47% 0.94% 0.47% 0.00% 0.00% 2.83% 0.94% 0.94% 1.42% 4.25% 3.77% 6.13% COMEDY -1 50% 0.25% 0.00%24 56%1.75% 4.51% 1.00% 0.00% 9.52% 0.50% 4.51% 1.25% 2.26% 1.75% 0.00% 5.26% 0.25% 2.26% 7.52% 0.50% 1.25% 0.75% 1.75% 5.01% 5.01% 5.276% 3.76% 2.01% 1.75% 3.51% 1.00% 2.01% 0.25% CRIME -2.93% 0.24% 0.24% 1.47% 24.52% 3.18% 1.22% 0.00% 3.42% 0.24% 0.49% 2.20% 0.73% 0.24% 1.22% 2.44% 1.96% 0.98% 2.20% 1.71% 1.22% 1.71% 0.24% 0.04% 0.09% 0.98% 0.00% 1.47% 1.71% 0.73% 0.24% 6.85% CULTURE & ARTS -1.93% 0.30% 0.00% 3.42% 1.63% 26.30% 0.74% 0.45% 6.09% 1.34% 2.53% 1.93% 1.63% 1.93% 2.82% 1.78% 1.04% 2.08% 1.93% 1.34% 3.42% 1.78% 1.19% 5.65% 4.31% 2.53% 3.27% 5.05% 0.59% 3.12% 2.38% 2.97% 2.53% DIVORCE -0.24% 0.00% 0.00% 0.24% 1.91% 2.15% 38.90% 0.48% 0.24% 0.48% 5.73% 0.24% 2.39% 1.67% 2.15% 0.48% 5.97% 7.16% 0.00% 1.43% 0.48% 0.72% 0.00% 0.40% 1.43% 3.82% 1.43% 2.15% 1.43% 2.15% 1.43% 0.72% EDUCATION -2.53% 1.01% 0.00% 0.00% 2.53% 5.05% 6.57% 8.59% 0.51% 3.54% 1.52% 0.51% 4.04% 0.00% 17.17% 1.01% 9.60% 3.54% 5.56% 1.01% 2.53% 0.00% 1.01% 1.01% 0.00% 1.01% 0.01% 0.51% 0.51% 0.51% 8.59% 4.04% 5.56% ENTERTAINMENT -3.36% 0.26% 0.00% 7.75% 5.17%10.59%0.78% 0.00% 2.326% 0.00% 0.78% 3.10% 0.52% 0.26% 0.78% 3.10% 0.26% 0.78% 2.33% 2.07% 2.58% 1.81% 2.33%10.85% 2.07% 0.52% 3.36% 1.29% 1.55% 4.39% 1.03% 1.81% 1.29% ENVIRONMENT -0.85% 1.13% 0.00% 0.28% 5.35% 7.04% 3.10% 0.85% 1.13% 7.32% 1.69% 2.54% 3.10% 9.30% 3.66% 4.79% 1.69% 4.23% 0.85% 2.54% 5.07% 1.13% 3.38% 1.69% 0.85% 4.23% 4.79% 1.41% 1.13% 2.54% 1.13% 9.58% FFTY - 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	precision	recall	f1-score	support
BLACK VOICES	0.2329	0.0867	0,1264	392
BUSINESS	0.2557	0.1474	0.1870	380
COLLEGE	0.3605	0.1462	0.2081	212
COMEDY	0.1662	0.1378	0.1507	399
CRIME	0.2632	0.3790	0.3106	409
CULTURE & ARTS	0.2898	0.3165	0.3026	673
DIVORCE	0.2155	0.2196	0.2175	419
EDUCATION	0.2905	0.3081	0.2990	198
ENTERTAINMENT	0.1770	0.3101	0.2254	387
ENVIRONMENT	0.2575	0.1690	0.2041	355
FIFTY	0.2046	0.3590	0.2606	273
GOOD NEWS	0.1553	0.0525	0.0784	305
HEALTHY LIVING	0.1747	0.1036	0.1301	386
HOME & LIVING	0.3303	0.3756	0.3515	386
IMPACT	0.2236	0.1800	0.1994	400
MEDIA	0.2243	0.1494	0.1793	395
MONEY	0.2864	0.3642	0.3207	324
PARENTING	0.2006	0.1611	0.1787	391
POLITICS	0.2086	0.1738	0.1896	420
QUEER VOICES	0.1811	0.0554	0.0849	415
RELIGION	0.2083	0.1136	0.1471	440
SCIENCE	0.2415	0.1377	0.1754	414
SPORTS	0.2905	0.2098	0.2436	410
STYLE	0.1385	0.4939	0.2163	413
STYLE & BEAUTY	0.3633	0.4655	0.4081	391
TASTE	0.2062	0.2846	0.2392	397
TECH	0.2541	0.1490	0.1879	416
TRAVEL	0.2655	0.2321	0.2477	405
WEDDINGS	0.1985	0.2050	0.2017	400
WEIRD NEWS	0.1361	0.1348	0.1355	408
WELLNESS	0.1940	0.3489	0.2493	407
WOMEN	0.2278	0.1350	0.1695	400
WORLD	0.2533	0.2847	0.2681	404
accuracy			0.2246	12824
macro avg	0.2326	0.2239	0.2150	12824
weighted avg	0.2311	0.2246	0.2151	12824

News - GloVe Epochs: 20 (25), Batch Size: 64

Accuracy: 0.2246 (0.2256) F1-Score: 0.2151 (0.2174)

- 1. Style & Beauty: 0.4081
- 2. Home & Living: 0.3515
- 3. Crime: 0.3106

Confusion Matrix for GloVe Embeddings

- 0.4

-03

- 0.2

-0.1

- 0.0

BLACK VOICES -8.67% 0.51% 1.28% 3.83% 11.99% 6.63% 1.79% 2.55% 13.01% 1.02% 2.04% 1.02% 1.02% 0.51% 2.04% 4.34% 0.77% 2.04% 2.81% 1.02% 1.53% 1.79% 2.81% 5.36% 3.32% 1.02% 1.02% 1.53% 2.04% 2.30% 2.81% BUSINESS -0.53%14.74%0.26% 0.26% 1.32% 6.58% 2.37% 2.17% 2.11% 2.89% 3.16% 0.00% 3.95% 0.79% 2.37% 2.11%12.63%1.05% 3.42% 0.79% 1.84% 0.84% 0.79% 7.11% 1.05% 2.63% 3.68% 2.63% 1.58% 1.84% 6.84% 0.79% 3.68% COLLEGE -1.89% 1.42% 14.62% 0.47% 6.13% 3.77% 0.94% 14.15% 2.83% 0.00% 3.30% 1.42% 3.30% 0.00% 2.36% 2.36% 3.30% 0.94% 2.83% 0.94% 1.42% 1.42% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 2.85% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.42% 0.47% 1.42% 0.47% 1.89% 0.94% 1.42% 0.47% 1.42\% 0.47% 1.42\% 0.47\% 1.42\% 1.42\% 0.47\% 1.42\% 0.42\% 0.42\% 0.42\% 0.42\% 0.42\% 0.42\% 0.42\% 0.42\% 0.42\% 0 COMEDY -0.75% 0.25% 0.00%13.78%1.75% 3.51% 1.00% 0.00%16 54%0.25%2.76%1.50% 2.01% 3.51% 0.50% 2.26% 0.75% 2.01%2.26% 0.50% 0.50% 0.25% 3.01%17.54%3.76% 2.26% 1.50% 1.50% 1.50% 1.25% 0.75% CRIME -2.20% 0.73% 0.00% 1.71% 17.90% 2.93% 1.96% 0.98% 2.93% 1.47% 0.73% 1.22% 1.47% 0.00% 0.49% 1.22% 1.71% 0.73% 2.44% 0.49% 2.44% 1.71% 1.22% 1.4.91% 0.49% 0.73% 1.22% 0.49% 1.22% 1.47% 0.11% CULTURE & ARTS -0.74% 0.59% 0.30% 2,82% 1.49% 1.65% 0.89% 0.59% 8.62% 0.89% 2.67% 0.30% 1.34% 2.53% 1.04% 0.89% 0.59% 0.59% 0.59% 1.04% 2.08% 2.23% 1.04% 1.5.30% 3.42% 2.67% 1.04% 2.53% 1.19% 2.97% 2.38% 2.08% 0.89% DIVORCE -0.72% 0.95% 0.72% 0.24% 2.86% 2.15% 21.96% 0.95% 1.67% 1.19% 7.40% 0.72% 1.67% 4.06% 1.91% 1.19% 5.97% 6.44% 0.72% 0.95% 0.48% 0.48% 0.95% 0.00% 4.30% 3.10% 0.24% 2.15% 13.60% 0.95% 6.44% 2.39% 0.48% EDUCATION -1.52% 3.54% 7.07% 0.00% 1.52% 6.06% 4.04% 0.81% 1.01% 1.52% 0.51% 1.01% 3.54% 1.01% 3.54% 1.01% 2.02% 2.53% 1.01% 1.52% 3.03% 1.52% 1.01% 2.02% 1.52% 0.51% 1.52% 0.51% 1.52% 1.01% 1.52% 1.01% 1.01% 2.53% ENTERTAINMENT - 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	precision	recall	f1-score	support
BLACK VOICES	0.5165	0.3597	0.4241	392
BUSINESS	0.4718	0.3526	0.4036	380
COLLEGE	0.5408	0.5000	0.5196	212
COMEDY	0.3839	0.4311	0.4061	399
CRIME	0.6236	0.6968	0.6582	409
CULTURE & ARTS	0.5997	0.6300	0.6145	673
DIVORCE	0.6513	0.7399	0.6927	419
EDUCATION	0.4582	0.5808	0.5122	198
ENTERTAINMENT	0.4502	0.4910	0.4697	387
ENVIRONMENT	0.5789	0.5268	0.5516	355
FIFTY	0.3785	0.2967	0.3326	273
GOOD NEWS	0.4517	0.4295	0.4403	305
HEALTHY LIVING	0.3363	0.2902	0.3115	386
HOME & LIVING	0.7069	0.7435	0.7247	386
IMPACT	0.4282	0.3875	0.4068	400
MEDIA	0.5879	0.5924	0.5902	395
MONEY	0.5805	0.5895	0.5850	324
PARENTING	0.4838	0.4962	0.4899	391
POLITICS	0.4723	0.4667	0.4695	420
QUEER VOICES	0.7350	0.5614	0.6366	415
RELIGION	0.6749	0.6841	0.6795	440
SCIENCE	0.6958	0.5966	0.6424	414
SPORTS	0.6704	0.7244	0.6964	410
STYLE	0.5473	0.5884	0.5671	413
STYLE & BEAUTY	0.6741	0.7724	0.7199	391
TASTE	0.6820	0.7834	0.7292	397
TECH	0.5756	0.6587	0.6143	416
TRAVEL	0.6337	0.7605	0.6914	405
WEDDINGS	0.7532	0.7325	0.7427	400
WEIRD NEWS	0.5000	0.3505	0.4121	408
WELLNESS	0.3883	0.5209	0.4449	407
WOMEN	0.4441	0.3775	0.4081	400
WORLD	0.6585	0.6634	0.6609	404
accuracy			0.5636	12824
macro avg	0.5556	0.5568	0.5530	12824
weighted avg	0.5617	0.5636	0.5595	12824

News - GoogleNews (w2v)

Epochs: 5, Batch Size: 64

Accuracy: 0.5636 F1-Score: 0.5595

- 1. Weddings: 0.7427
- 2. Taste: 0.7292
- 3. Home & Living: 0.7247

Confusion Matrix for Dense Embeddings

- 0.7

- 0.6

- 0.5

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

	BLACK VOICES	35.97%	0.51% 3	.32% 1.02	% 8.67%	4.34%	1.28% 2.	81% 8.42	% 0.00%	0.26%	1.02% 0	26% 0.26	% 3.57%	2.81% 0	0.51% 1	.28% 3.	57% 1.5	3% 3.32	% 0.00%	4.59% 2.0	4% 2.81	% 0.51% 0	0.77% 0.	26% 0.5	51% 1.0	2% 1.28	6 1.289	6 0.26%	
	BUSINESS	-0.00%	35.26%0	.53% 1.58	1% 0.79%	2.11%	1.05% 2.	37% 0.53	% 2.89%	0.79% (0.00% 3.	16% 0.53	% 3.42%	2.63%1	3.42%1	.84% 4.	47% 0.7	9% 0.00	% 0.26%	0.79% 1.0	5% 0.53	1% 1.05% 7	.37% 1.	58% 0.0	0% 0.5	3% 4.47	% 2.379	% 1.84%	
	COLLEGE	-4.25%	2.36%	0.00%1.42	% 3.30%	3.30%	0.47%12	.74%0.47	% 0.94%	0.00% (D.47% 1.	42% 0.00	1.42%	1.42% 1	.89% 1	.42% 2.	83% 0.4	7% 0.94	% 0.00%	2.36% 0.9	4% 0.00	1% 0.94% 0	0.00% 0.	94% 0.0	0% 0.0	0% 1.899	6 1.429	6 0.00%	
	COMEDY	-0.75%	0.75% 0	1.25% ^{13.11}	1% <mark>0.25%</mark>	2.51%	0.75% 0.	50% 7.52	% 1.50%	1.50% 2	2.26% 1.	00% 1.00	1% 0.25%	3.76% 0	0.00% 2	.01%6.	27% 0.7	5% 1.25	% 2.01%	2.26% 4.5	1% 1.00	1% 1.25% 1	.75% 1.	75% 0.7	75% 4.7	5% 0.00	% 1.759	6 0.25%	
	CRIME	-3.67%	0.24% 0	1.49% 0.24	<mark>%</mark> 59.68%	0.24%	0.00% 0.	49% 0.24	% 0.49%	0.00% :	1.47% 0.	49% 0.00	1% 0.73%	0.98% (0.00% 1	.22% 1.	47% 0.2	4% 1.96	% 0.49%	0.98% 0.0	0% 0.24	1% 0.00% 2	.93% 0.	00% 0.2	24% 5.6	2% 0.49	% 1.719	62.93%	
4	CULTURE & ARTS	-3.71%	0.15% 0	.30% 4.31	% 0.15%	53.00%	0.89% 0.	45% 3.12°	% 0.45%	0.74% (0.59% 1.	04% 1.93	% 0.74%	1.04% (0.15% 0	.59% 0.	.00% 0.5	9% 1.19	% 1.49%	0.59% 1.9	3% 1.19	1% 0.74% 1	.19% 2.	53% 0.3	30% 0.8	9% 0.89	% 2.239	6 0.89%	
	DIVORCE	-0.24%	0.24% 0	.48% 0.00	% 0.00%	0.95%	73.99% <mark>0</mark> .	24% 1.67	% 0.00%	1.67% (0.48% 0.	48% 1.19	% 0.24%	0.00% (0.95% 3	.34% 0.	00% 1.1	9% 0.24	% 0.00%	0.48% 0.2	4% 0.48	I% 0.48% 0	0.72% 0.	48% 4.7	7% 0.4	3% 2.39	% 1.67%	6 0.24%	
	EDUCATION	-0.51%	2.02%8	.08% 0.51	% 1.01%	2.53%	0.00%58	.08% <mark>0.00</mark> '	% 0.51%	0.00% (D.00% 1.	52% 0.00	1% 7.58%	0.00% 3	.54% 3	.54% 3.	.03% 0.0	0% 2.02	% 0.51%	1.01% 0.5	1% 0.00	1% 0.00% 1	.01% 0.	00% 0.0	00% 0.0	0% 1.529	6 0.519	6 0.51%	
	ENTERTAINMENT	-4.13%	0.52% 0	.00% 9.30	0.78%	9.04%	1.55% 0.	00% ^{49.10}	0.00%	0.00% (0.52% 0.	.00% 0.00	1% 0.00%	3.88% (0.00% 1	.55% 1.	81% 1.2	9% 0.26	% 0.00%	2.07% 5.1	7% 2.33	1% 0.00% 1	.55% 0.	26% 1.0	3% 0.7	3% 0.52	% 2.339	% 0.26%	
	ENVIRONMENT	-0.28%	2.54% 0	0.00% 0.28	1% 0.85%	2.54%	0.00% 0.	56% 0.56	<mark>%</mark> 52.68%	0.28%	7.04% 1.	13% 1.13	% 4.51%	1.97% (0.56% 1	.41% 1.	97% 0.2	8% 0.85	% 3.66%	0.56% 0.0	0% 0.00	% 1.69% 1	.13% 2.	54% 0.0	00% 5.0	°% 0.85°	% 0.28%	6 2.82%	
	FIFTY	-0.00%	0.73% 1	.83% 1.83	% 0.37%	2.20%	4.76% 0.	73%2.56	% 0.00%2	29.67%	1.47% 8	.06% 0.73	% 0.73%	0.00% 3	.66% 9	.89% 1.	10% 0.7	3% 0.73	% 0.73%	0.37% 4.4	0% 0.37	% 1.47% 1	.10% 5.	86% 1.8	33% 0.3	7% 6.23	% 5.49%	6 0.00%	
	GOOD NEWS	-0.98%	0.98% 0	.66% 2.30	% 2.62%	3.28%	0.98% 1.	31% 2.62	% 3.93%	1.64%	2.95% <mark>1</mark>	97% 0.98	1% 3.28%	0.33% (0.00% 3	.93% 0.	66% 0.0	0% 0.98	% 0.66%	4.26% 2.9	5% 0.00	1% 0.98% 1	.31% 0.	33% 1.6	54% 5.9	0% 2.62	% 1.97%	6 0.98%	
	HEALTHY LIVING	-0.26%	2.07% 0	.26% 1.04	% 0.00%	1.81%	2.33% 1.	30% 1.81	% 0.78%	3.89%	1.55%29	.02%0.52	% 2.85%	0.52% (0.26% 4	.40% 0.	52% 0.7	8% 0.52	%2.85%	1.55% 3.6	3% 0.26	i% 1.81% 1	.55% 0.	78% 0.7	78% 1.5	5%26.42	%1.819	6 0.52%	
	HOME & LIVING	-0.26%	0.52% 0	0.00% 1.04	% 0.00%	2.07%	0.26% 0.	26% 0.26	% 1.04%	1.04% (0.00% 0.	.26% <mark>7</mark> 4.3	5% <mark>0.26</mark> %	0.00%]	.81% 1	.04% 0.	.00% 0.0	0% 0.26	% 0.26%	0.26% 1.8	1% 4.66	i% 2.59% 1	.04% 1.	55% 0.7	78% 0.7	3% 1.049	6 0.529	6 0.00%	
	IMPACT	-1.00%	3.25% 1	00% 0.00	1% 0.50%	2.50%	0.00% 3.	75% 0.75	% 3.75%	2.25% 4	4.25% 4.	50% 1.25	<mark>%</mark> 38.75%	0.50% 3	.25% 2	.50% 2.	.00% 1.2	5% 2.50	% 0.50%	1.25% 1.2	5% 0.50	1% 1.00% 2	.75% 1.	25% 0.0	00% 0.0	0% 4.50	% 3.25%	6 4.25%	
2	MEDIA	-1.01%	1.27% 1	27% 6.58	% 1.01%	3.29%	0.00% 0.	25% 2.03	% 0.25%	0.25% (0.00% 0	76% 0.25	% 1.01%	59.24%	0.00% 0	.51% 9.	62% 0.2	5% 1.77	% 1.01%	1.52% 0.2	5% 1.01	% 0.00% 3	1.04% 0.	51% 0.0	00% 0.0	0% 0.25	% 1.279	6 0.51%	
	MONEY	-0.31%	6.48% 1	54% 0.62	% 2.47%	0.62%	3.09% 1.	54% 0.00	% 0.62%	1.54% (0.00% 0	62% 1.85	% 1.54%	0.00%	8.95% <mark>0</mark>	.31% 1.	54% 0.0	0% 0.31	% 0.00%	0.31% 0.3	1% 0.62	% 0.62% 5	.86% 3.	09% 1.5	54% 0.6	2% 2.78	% 0.00%	6 0.31%	
	PARENTING	-0.00%	0.26% 0	.51% 1.79	% 0.26%	1.79%	5.12% 4.	35% 1.28	% 1.02%	3.84% 3	3.32% 2	.05% 2.05	% 2.56%	0.77% 1	.02%	9.62% <mark>0</mark> .	51% 0.5	1% 0.51	% 0.51%	1.02% 1.0	2% 1.53	1% 2.05% 0	0.51% 0.	26% 0.5	51% 0.7	7% 5.639	6 2.819	6 0.26%	
	POLITICS	-2.14%	3.57% 0	.71% 5.71	% 3.33%	0.71%	0.24% 1.	67% 1.43	% 3.10%	0.00% (D.00% 1.	67% 0.00	1% 2.86%	7.14% 1	.19% 0	.00%16	.67% <mark>0.</mark> 9	5% 3.33	% 0.95%	1.19% 0.4	8% 0.00	1% 0.00% 1	.67% 0.	71% 0.0	00% 0.4	3% 0.48°	% 2.629	% 5.00%	
	QUEER VOICES	-0.96%	0.96% 0	0.00% 1.93	1% 1.20%	2.17%	2.41% 0.	48% 4.58	% 0.00%	1.45% :	1.20% 0	.96% 0.48	% 1.69%	1.93% 0	0.00% 1	.20% 3.	37%56.	4%2.65	% 0.00%	1.69% 2.4	1% 1.20	1% 0.48% C	0.72% 0.	72% 1.9	93% 0.2	1.209	6 2.179	6 1.45%	
	RELIGION	-1.14%	0.23% 1	36% 0.45	% 1.59%	2.95%	0.23% 0.	00% 0.68	% 0.23%	0.68% (D.68% 1.	59% 1.14	% 2.73%	0.23% 0	0.00% 1	.14% 2.	.73% 1.8	2% <mark>58.4</mark> :	<mark>%</mark> 0.68%	0.91% 0.0	0% 0.23	1% 0.23% 0	0.68% 0.	91% 0.0	00% 0.2	3% 1.59	6 0.919	6 3.64%	
	SCIENCE	-0.00%	0.24% 0	.48% 2.90	1% 0.24%	3.14%	0.48% 1.	21% 0.97	% 4.59%	0.48% (0.48% 5.	31% 0.48	1% 0.48%	0.00% 0	0.24% 0	.72% 0.	24% 0.4	8% 0.48	%59.66%	0.24% 1.2	1% 0.48	1.69% 0	0.97% 0.	72% 0.4	18%2.1	7% 7.73	6 0.729	6 0.24%	
	SPORTS	-0.98%	0.49% 0	.98% 4.39	% 1.71%	0.98%	0.24% 0.	49% 1.46	% 0.49%	0.00% :	1.95% 0.	.98% 0.00	1% 0.49%	2.20% 0	0.24% 0	.24% 0.	49% 0.4	9% 0.00	% 0.24%	2.44%0.4	9% 0.00	1% 0.49% 0	0.73% 1.	22% 0.2	24% 0.9	3% 0.49	% 0.98%	62.44%	
	STYLE	-1.69%	0.73% 0	.00% 2.91	% 0.00%	2.66%	0.48% 0.	00% 5.08	% 0.24%	0.24% (0.48% 0.	97% 1.69	% 0.48%	1.21% (0.24% 0	.48% 0.	97% 0.0	0% 0.00	% 0.48%	0.73%58.	84% <mark>10.1</mark>	7%1.94% 0	0.73% 1.	21% 0.9	97% 0.9	7% 0.249	% 2.91%	6 0.24%	
3	STYLE & BEAUTY	-0.26%	0.77% 0	.26% 1.02	% 0.00%	1.79%	0.26% 0.	00% 2.05	% 0.00%	0.51% (0.26% 0	.00% 2.81	.% 0.00%	0.00% 0	0.51% 0	.26% 0.	00% 0.5	1% 0.26	% 0.00%	0.00% 5.1	2% 7 7.2	4% 0.00% 0	0.26% 1.	53% 1.2	8% 0.0	0% 1.28	6 1.539	6 0.26%	
	TASTE	-0.50%	0.50% 0	0.00% 1.01	% 0.00%	0.00%	0.25% 0.	25% 0.50	% 0.00%	0.00% (0.25% 1.	01% 3.78	% 0.76%	0.00% 0	0.25% 0	.76% 0.	25% 0.0	0% 0.76	% 0.00%	0.76% 1.0	1% 0.50	1% <mark>78.34%0</mark>	0.76% 5.:	29% 0.2	25% 1.2	5% 0.76	% 0.259	6 0.00%	
	TECH	-0.96%	3.37% 0	0.72% 0.96	i% 0.72%	2.16%	0.96% 0.	96% 0.72'	% 0.96%	0.00% (0.72% 0	48% 0.48	1% 0.24%	2.88% 1	.20% 1	.68% 2.	16% 0.0	0% 0.96	% 1.92%	0.72% 1.4	4% 0.48	1% 0.24%5	5.87%0.	72% 0.2	24% 0.9	5% 0.72°	% 0.96%	62.40%	
	TRAVEL	-0.00%	0.74% 0	0.00% 0.00	1% 0.25%	3.46%	0.25% 0.	00% 0.25	% 0.49%	1.48% (D.00% 0.	.49% 0.74	% 0.49%	0.25% 0	0.99% 0	.74% 0.	25% 0.4	9% 0.99	% 0.74%	0.49% 0.7	4% 0.99	1% 3.95% 1	.23%76	.05%1.2	23% 0.2	5% 1.739	6 0.00%	6 0.25%	
	WEDDINGS	-0.00%	0.25% 0	.50% 1.00	1% 0.25%	0.50%	9.00% 0.	00% 1.25	% 0.00%	1.00% (0.50% 0.	50% 1.50	1% 0.50%	0.00% (0.25% 2	.50% 0.	.00% 0.2	5% 0.00	% 0.25%	0.25% 1.0	0% 1.25	i% 0.00% 0	0.75% 1.	50% <mark>7</mark> 3.2	25% <mark>0.0</mark>	0% 1.75	6 0.259	6 0.00%	
	WEIRD NEWS	-0.25%	0.74% 0	.25% 8.58	% 8.09%	3.68%	0.25% 0.	00% 1.72	% 3.19%	0.00%	7.60% 0	25% 1.72	% 0.25%	0.49% (0.49% 0	.74% 0.	98% 0.9	8% 1.47	% 2.94%	2.94% 2.9	4% 0.74	1% 4.66% 4	.90% 2.	70% 0.7	74%35.0	5% 0.00	% 0.25%	6 0.49%	
	WELLNESS	-0.25%	0.74% 0	0.00% 0.25	% 0.74%	1.97%	2.70% 1.	23% 0.98	% 1.23%	3.93% (0.25%11	.06%0.49	% 2.70%	0.00% 1	.23% 2	.46% 0.	.00% 0.7	4% 0.98	% 2.21%	0.25% 0.0	0% 0.74	1% 5.16% O	0.74% 1.	47% 0.4	19% 0.0	<mark>0%5</mark> 2.09	2.469	% 0.49%	
	WOMEN	-1.75%	1.25% 1	.50% 2.75	% 2.00%	3.00%	2.75% 0.	50% 1.50	% 0.00%	3.50% (0.50% 4.	50% 0.00	% 4.00%	3.50% (0.50% 4	.25% 2.	.25% 3.2	5% 1.75	% 0.50%	1.75% 3.0	0% 1.50	1% 1.00% 0	0.75% 0.	00%2.0	00% 0.0	0% 6.25	% 37.75	0.50%	
	WORLD	-0.50%	1.73% 0	0.00% 0.25	% 2.72%	0.99%	0.50% 0.	25% 0.25	% 2.48%	0.50% :	1.24% 0.	25% 0.25	% 4.95%	0.50% 0	0.50% 0	.00% 3.	47% 0.2	5% 3.96	% 0.99%	0.74% 0.2	5% 0.00	1% 0.00% 1		22% 0.2	25% 0.5	0% 0.50	% 0.009	656.34%	
		ICES -	VESS -	LEGE -	RIME -	ARTS -	PRCE -	- TION -	tent -	- YTH	IEWS -	- DNIV	PACT -	EDIA -	- Yang	- SNIL	- TICS -	SION -	- SNCE -	DRTS -	AUTY -	ASTE -	- HOE	AVEL -	- SUN	VESS -	MEN -	- OINO	
		ACK VO	BUSIN	COL	D	URE & J	DIVC	EDUCA	VIRONN		N DOOS	AE & LN	IME	M	MC	PAREN	POLI	LELIC RELIC	SCIE	Š,	د E & BE/	ŕ		TR	WEDU	WELLP	WO	WC	
		BL				CULT		ENTE	ENV		9	HEA HON						2			STYL				3				

News - GoogleNews (w2v)

Epochs: 15, Batch Size: 64

Accuracy: 0.5771 F1-Score: 0.5733

- 1. Home & Living: 0.7460
- 2. Weddings: 0.7449
- 3. Taste: 0.7335

<u>.</u>	precision	recall	f1-score	support
BLACK VOICES	0.4759	0.4031	0.4365	392
BUSINESS	0.4767	0.3500	0.4036	380
COLLEGE	0.6061	0.5660	0.5854	212
COMEDY	0.4709	0.3860	0.4242	399
CRIME	0.6440	0.6944	0.6682	409
CULTURE & ARTS	0.6152	0.6508	0.6325	673
DIVORCE	0.6637	0.7160	0.6889	419
EDUCATION	0.5698	0.5152	0.5411	198
ENTERTAINMENT	0.4583	0.5116	0.4835	387
ENVIRONMENT	0.5238	0.5887	0.5544	355
FIFTY	0.3426	0.3626	0.3523	273
GOOD NEWS	0.5111	0.3770	0.4340	305
HEALTHY LIVING	0.3660	0.2902	0.3237	386
HOME & LIVING	0.7150	0.7798	0.7460	386
IMPACT	0.4516	0.4200	0.4352	400
MEDIA	0.5837	0.6177	0.6002	395
MONEY	0.5695	0.6451	0.6049	324
PARENTING	0.4828	0.5729	0.5240	391
POLITICS	0.4583	0.4714	0.4648	420
QUEER VOICES	0.6773	0.6120	0.6430	415
RELIGION	0.6770	0.6955	0.6861	440
SCIENCE	0.6966	0.5990	0.6442	414
SPORTS	0.6616	0.7488	0.7025	410
STYLE	0.6554	0.5617	0.6050	413
STYLE & BEAUTY	0.6928	0.7673	0.7282	391
TASTE	0.6896	0.7834	0.7335	397
TECH	0.6439	0.6562	0.6500	416
TRAVEL	0.6887	0.7210	0.7045	405
WEDDINGS	0.7604	0.7300	0.7449	400
WEIRD NEWS	0.4695	0.3775	0.4185	408
WELLNESS	0.4124	0.5725	0.4794	407
WOMEN	0.4499	0.3925	0.4192	400
WORLD	0.6571	0.6832	0.6699	404
accuracy			0.5771	12824
macro avg	0.5702	0.5703	0.5676	12824
weighted avg	0.5746	0.5771	0.5733	12824

Confusion Matrix for Dense Embeddings

- 0.7

- 0.6

- 0.5

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

BLACK VOICES	-40.31	0.77%	2.81% 1.	02% 6.	63% 4.	59% 0.51%	6 1.79% 7.	14% 0.2	6% 0.26%	0.77% 0	0.26% 0.	26% 2.	55% 2.55	5% 0.77%	1.28%	3.57% 2	.04% 2	.81% 0.009	6 5.10% 3	L.79% 2.	81% 0.2	6% 0.77	% 0.00%	1.02%	1.02%]	.53% 2.	30% 0.5	1%
BUSINESS	-0.539	635.00%	0.26% 0.	79% 0.	79% 1.	58% 1.32%	6 0.79% 0.	53% 3.4	2% 1.05%	0.00% 3	3.42% 0.	53% 3.4	12% 3.95	5%13.95%	61.05% 4	4.74% 0	.53% 0	26% 1.05	6 0.79% (0.26% 0.	26% 1.0	5% 6.58	% 1.32%	0.26%	0.53% 4	.47%2.	89% 2.6	3%
COLLEGE	-4.259	6 0.94%	6.60% <mark>0</mark> .	94% 1.	89%2.	B3% 0.47%	6 8.02% 0.	00% 1.4	2% 0.94%	0.00% 1	L.42% O.	00% 1.4	42% 1.42	2% 2.83%	0.94%	1.89% 0	.47% 0	.94% 0.009	% 1.89% (0.94% 0.	00% 0.9	4% 0.00	% 0.47%	0.00%	D.47% 1	.89% 3.	77% 0.0	D%
COMEDY	-1.00%	6 1.00%	0.00%88	.60% <mark>0</mark> .	25% 3.9	51% 0.50%	6 0.25% 8.	52% 1.5	0% 3.51%	1.50% 1	1.50% 1.	25% 0.3	25% 4.26	5% 0.25%	2.51%6	5.52% 1	.00% 1	00% 2.01	% 2.51% 2	2.51% 1.	75% 1.5	0% 1.00	% 1.00%	0.75%	5.02% 0	.00% 1.	75% 0.5	D%
CRIME	-5.13%	6 0.24%	0.49% 0.	00%59	.44%0.:	24% 0.00%	6 0.00% 0.	98% 0.4	9% 0.00%	1.22% (0.73% 0.	24% 0.3	73% 0.98	3% 0.49%	0.98% :	1.22% 0	.73% 1.	22% 0.249	% 0.73% (0.00% 0.	24% 0.2	4% 2.20	% 0.00%	0.24%	5.36% (.24% 1.	71% 2.2	D%
CULTURE & ARTS	-3.129	6 0.15%	0.15% 1.	78% 0.	15%55	.08%0.89%	6 0.15% 4.	01% 1.0	4% 1.04%	0.89% (0.89%2.	08% 0.3	74% 0.89	9% 0.15%	0.74% (0.15% 0	.89% 1.	34% 1.499	% 0.74% :	L.04% 1.	19% 0.5	9% 0.74	% 1.49%	0.45%	1.49% (.74% 2.	67% 1.0	4%
DIVORCE	-0.729	6 0.48%	0.24% 0.	00% 0.	00% 0.	48%71.60%	0.24% 1.	43% 0.0	0% 3.10%	0.24% (0.48% 0.	72% 0.3	24% 0.00	0% 1.43%	3.58% (0.00% 1	.67% 0	24% 0.009	6 0.72% (0.00% 0.	72% 0.4	8% 0.72	% 0.48%	5.49%	0.24% 2	.39% 1.	67% 0.2	4%
EDUCATION	-2.029	6 2.53%]	0.10%0.	00% 1.	01% 3.	03% 0.00%	651.52%0.	00% 1.0	1% 0.00%	0.00% 3	L.01% 0.	00% 6.!	57% 0.51	1% 3.03%	5.56%	3.03% 1	.01% 1.	52% 0.51	% 1.01% (0.00% 0.	00% 0.0	0% 1.52	% 0.51%	0.00%	0.00% 2	.53% 0.	00% 0.5	1%
ENTERTAINMENT	-5.17%	6 0.52%	0.00% 6.	46% 0.	52% 6.	98% 1.29%	6 0.00%51	.16% <mark>0.0</mark>	0% 0.26%	0.52% (0.26% 0.	00% 0.0	00% 3.62	2% 0.00%	1.55% :	1.55% 1	.29% 0	.52% 0.78	% 3.10% 4	1.65% 2.	07% 0.0	0% 1.29	% 0.52%	0.52%	1.55% (.52% 2.	84% 0.5	2%
ENVIRONMENT	-0.85%	6 1.97%	0.00% 0.	56% 1.	13% 1.	69% 0.28%	6 0.28% 0.	28%58.8	37% <mark>0.28%</mark>	5.07%]	1.41% 1.	13% 4.	51% 1.69	9% 0.56%	1.41%	2.54% 0	.28% 0	.85% 1.97	% 0.85% (0.00% 0.	00% 1.6	9% 0.28	% 1.41%	0.00%	3.94% 1	.97% 0.	00% 2.2	5%
FIFTY	-0.37%	6 0.73%	1.10% 1.	10% 0.	.00% 2.:	20% 4.40%	6 1.10% 1.	83% 0.3	7%36.26%	0.73% 7	7.33% 1.	83% 1.8	33% 0.3	7% 3.30%	8.79%	1.47% 1	.10% 1	10% 0.379	6 0.73%	2.56% 0.	37% 1.1	0% 1.10	% 4.40%	1.10%	0.73% 6	.23% 4.	03% 0.0	D%
GOOD NEWS	-1.649	6 0.66%	0.33% 1.	64% 2.	30% 3.:	28% 0.66%	6 0.66% 3.	28% 6.5	6% 1.97%	37.70% <mark>1</mark>	L.97% O.	66% 6.	56% 0.66	5% 0.00%	3.93% (0.66% 1	.31% 1.	31% 0.989	% 3.28% :	L.64% 0.	00% 0.9	8% 0.33	% 0.66%	1.31%	8.20% 3	.28% 0.	66% 0.9	8%
HEALTHY LIVING	-0.26%	62.85%	0.52% 0.	78% 0.	.00% 1.	04% 1.55%	6 0.52% 1.	04% 1.0	4% 6.22%	0.52%2	9.02%0.	78% 2.:	33% 0.26	5% 0.52%	5.70% :	1.30% 1	.30% 0	.26% 3.37%	6 1.30% (0.52% 0.	78% 2.0	7% 1.55	% 0.52%	0.52%	1.30%2	7.72%2.	07% 0.5	2%
HOME & LIVING	-0.789	6 0.26%	0.00% 0.	78% 0.	.00% 2.	07% 0.26%	6 0.00% 0.	00% 1.0	4% 1.04%	0.00% 0	0.26%/7	.98%0.:	26% 0.00	0% 1.81%	1.55% (0.00% 0	.00% 0	.26% 0.009	% 0.00% :	L.04% 3.	37% 2.8	5% 0.78	% 0.52%	1.04%	0.78% 1	.30% 0.	00% 0.0	D%
IMPACT	-1.50%	6 3.50%	1.00% 0.	00% 0.	50%2.	00% 0.25%	6 2.25% 0.	50% 4.5	0% 2.50%	2.25% 3	3.75% 0.	75% <mark>42</mark> .	00%1.25	5% 2.75%	4.00%	2.25% 1	.75% 3.	25% 0.50	% 1.25% (0.50% 0.	75% 1.2	5% 2.25	% 1.25%	0.25%	0.25% 3	.50% 2.	50% 3.2	5%
MEDIA	-1.019	61.01%	0.76% 4.	56% 1.	01% 2.	53% 0.00%	6 0.25% 1.	52% 0.5	1% 0.25%	0.00% (0.51% 0.	25% 0.3	76%51.7	<mark>7%</mark> 0.00%	0.51%1	0.63%0	.51% 1.	01% 0.76	6 1.77% (0.25% 1.	27% 0.0	0%2.28	% 0.51%	0.00%	0.00% 1	.01% 1.	27% 1.5	2%
MONEY	-0.00%	65.86%	1.23% 0.	31% 2.	16% 0.	93% 2.47%	6 0.31% 0.	31% 0.6	2% 1.85%	0.00% (0.31% 1.	23% 2.:	16% 0.31	1%54.519	0.93% :	1.23% 0	.00% 0	.31% 0.009	6 0.31% (0.31% 0.	00% 0.6	2% 3.40	% 2.78%	1.85%	0.93% 2	.47% 0.	00% 0.3	1%
PARENTING	-0.519	6 0.26%	0.26% 0.	77% 0.	26% 1.	79% 3.07%	6 2.56% 1	53% 1.0	2% 4.60%	2.30% 1	L.79% 2.	81% 2.	56% 0.7	7% 1.28%	57.29%	0.26% 1	.28% 0	77% 0.51	6 1.02% (0.26% 0.	51% 1.7	9% 0.51	% 0.26%	0.26%	0.26% 4	.09%2.	81% 0.0	0%
POLITICS	-2.86%	62.62%	0.48% 3.	57% 3.	33% 0.	95% 0.24%	6 0.95% 1.	19% 3.8	1% 0.00%	0.00% 2	2.38% 0.	00% 2.0	52% 6.90	0% 1.67%	0.48%	7.14%1	.43% 2	.86% 0.249	% 1.43% (0.00% 0.	00% 0.0	0% 1.43	% 0.24%	0.00%	0.48% (.48% 4.	05% 6.1	9%
QUEER VOICES	-1.939	6 0.96%	0.24% 1.	20% 1.	45% 2.4	41% 1.20%	6 0.24% 3.	86% 0.0	0% 1.69%	0.96% (0.72% 0.	48% 1.6	59% 1.69	9% 0.48%	1.69% 2	2.89% 51	1.20%2	.89% 0.009	% 1.45% :	L.93% 0.	72% 0.2	4% 0.48	% 0.24%	1.69%	0.96% (.48% 1.	20% 0.7	2%
RELIGION	-1.829	6 0.23%	0.68% 0.	68% 2.	27% 3.:	18% 0.23%	6 0.00% 0.	45% 0.4	5% 0.91%	0.45%]	1.36% 0.	91% 2.	50% 0.23	3% 0.00%	1.36%	1.82% 2	.27%59	.55%0.91	% 0.68% (0.00% 0.	00% 0.2	3% 0.23	% 0.45%	0.00%	0.23% 1	.36% 0.	68% 3.8	5%
SCIENCE	-0.009	6 0.72%	0.48% 1.	45% 0.	24%2.	90% 0.72%	6 0.72% 1.	21% 6.2	8% 0.48%	0.24% 5	5.56% 0.	24% 0.3	24% 0.24	1% 0.24%	1.21% (0.24% 0	.48% 0	48%59.90	<mark>%</mark> 0.72% (0.24% 0.	48% 1.6	9% 0.97	% 0.48%	0.24%	2.42% 7	.25% 1.	21% 0.0	D%
SPORTS	-1.719	6 0.73%	1.22% 2.	68% 1.	46% 0.	98% 0.24%	6 0.24% 0.	73% 0.4	9% 0.49%	1.22% (0.98% 0.	00% 0.4	49% 1.71	L% 0.24%	0.98% :	1.22% 0	.49% 0	.00% 0.249	674.88%	0.49% 0.	00% 0.4	9% 0.24	% 0.73%	0.24%	1.71% (.24% 0.	73% 1.7	1%
STYLE	-1.94%	61.45%	0.24% 2.	42% 0.	.00% 3.1	37% 0.48%	6 0.00% 5.	08% 0.4	8% 0.73%	0.24% (0.73% 1.	45% 0.4	48% 0.97	7% 0.48%	0.97% :	1.21% 0	.00% 0	.00% 0.48	% 0.97%5	6.17% <mark>1</mark> 0	.17%1.9	4% 0.73	% 1.45%	1.21%	0.48% (.48% 2.	42% 0.2	4%
STYLE & BEAUTY	-0.269	6 0.77%	0.26% 1.	02% 0.	.00% 1.	79% 0.51%	6 0.00% 2.	05% 0.0	0% 0.77%	0.00% (0.00% 2.	81% 0.0	00% 0.00	0% 0.51%	0.26%	0.26% 0	.51% 0	26% 0.51	% 0.51% 4	1.09%76	.73%0.0	0% 0.51	% 1.53%	0.77%	0.26% 1	.28% 1.	53% 0.2	5%
TASTE	-0.259	6 0.76%	0.00% 0.	25% 0.	00% 0.:	25% 0.25%	6 0.25% 1	01% 0.7	6% 0.00%	0.00% 1	l.51% 3.	02% 0.	50% 0.00	0% 0.50%	1.01% (0.25% 0	.00% 1.	01% 0.009	6 1.26% (0.50% 0.	25% <mark>78.</mark> 3	4%0.50	% 4.28%	0.00%	2.02% 1	.01% 0.	25% 0.0	D%
TECH	-0.729	63.61%	0.24% 0.	24% 0.	48%2.	16% 0.72%	6 0.48% 0.	96% 0.9	6% 0.00%	0.72% (0.48% 0.	24% 0.4	48% 3.61	1.92%	2.64%	2.40% 0	.00% 1.	20% 2.649	6 0.24% (0.72% 0.	24% 0.0	0%55.62	2% <mark>0.48</mark> %	0.48%	0.96% (.48% 0.	96% 2.8	B%
TRAVEL	-0.00%	6 0.74%	0.00% 0.	00% 0.	25% 3.	70% 0.00%	6 0.00% 0.	99% 1.9	8% 1.98%	0.25% (0.25% 1.	73% 0.3	74% 0.2	5% 0.99%	0.99% (0.25% 0	.99% 0.	99% 0.49	6 0.74% (0.00% 0.	74% 3.9	5% 0.99	%72.109	0.74%	0.74% 1	.23% 0.	00% 1.2	3%
WEDDINGS	-0.00%	6 0.25%	0.25% 0.	75% 0.	25% 0.	50%10.50%	60.00% 1	00% 0.0	0% 2.25%	0.25% (0.00% 1.	50% 0.	75% 0.00)% 0.00%	1.00% (0.00% 0	.50% 0	.00% 0.25	6 0.25% :	L.00% 1.	50% 0.0	0% 0.50	% 1.25%	73.00%	0.00% 2	.00% 0.	50% 0.0	0%
WEIRD NEWS	-0.749	6 0.25%	0.49% 5.	39% 8.	.58% 3.3	19% 0.49%	6 0.00% 2.	70% 3.9	2% 0.74%	5.88% (0.74% 1.	72% 0.3	25% 1.23	3% 0.49%	1.47% :	1.23% 1	.47% 1.	23% 3.439	6 2.94% :	L.96% 0.	98% 4.4	1% 2.94	% 1.96%	0.49%	7.75% <mark>(</mark>	.25% 0.	25% 0.4	9%
WELLNESS	-0.00%	6 0.74%	0.00% 0.	49% 0.	49% 2.4	46% 2.21%	6 0.74% 0.	98% 1.9	7% 4.42%	0.25% 5	5.41% 0.	74% 3.6	59% 0.25	5% 1.47%	3.19% (0.00% 0	.74% 0.	98% 1.729	6 0.25% 0	0.25% 0.	49% 4.4	2% 0.49	% 1.47%	0.25%	0.00%	7.25%1.	97% 0.2	5%
WOMEN	-2.50%	6 1.00%	1.25% 1.	25% 0.	75% 3.	00% 3.50%	6 0.50% 1.	75% 0.0	0% 4.25%	0.25% 4	4.00% 0.	00% 2.	50% 2.50	0% 0.75%	3.75% 3	3.75% 4	.50% 2	.50% 0.75	6 2.25%	2.25% 0.	75% 1.0	0% 1.00	% 0.00%	1.75%	0.25% 6	.00%39	.25% <mark>0.5</mark>	0%
WORLD	-0.999	6 0.99%	0.00% 0.	25% 2.	97% 0.	74% 0.50%	6 0.25% 0.	00% 3.4	7% 0.50%	0.74% 0	0.25% 0.	25% 3.4	17% 0.99	9% 0.99%	0.50%	3.47% 0	.25% 3.	96% 0.50%	6 0.50% (0.00% 0.	00% 0.0	0% 0.99	% 1.98%	0.50%	0.74% (.50% 0.	50% 58.3	2%
	ACK VOICES -	BUSINESS -	- COLLEGE -	COMEDY -	CRIME -	JRE & ARTS - DIVORCE -	EDUCATION -	RTAINMENT -	- HFTY -	OOD NEWS -	THY LIVING -	IE & LIVING -	MEDIA -	- YENOM	PARENTING -	POLITICS -	EER VOICES -	RELIGION -	SPORTS -	- STYLE -	E & BEAUTY - TASTE -	TECH -	TRAVEL -	WEDDINGS -	EIRD NEWS -	- NELLNESS -	WOMEN -	
	BL					CULT	_	ENTE	5	0	HEA	ЮН					QU.				STYL				3			

	precision	recall	f1-score	support
BLACK VOICES	0.3981	0.4235	0.4104	392
BUSINESS	0.4026	0.3316	0.3636	380
COLLEGE	0.5445	0.4906	0.5161	212
COMEDY	0.4452	0.3459	0.3893	399
CRIME	0.6085	0.6993	0.6507	409
CULTURE & ARTS	0.6184	0.5899	0.6038	673
DIVORCE	0.6256	0.6539	0.6394	419
EDUCATION	0.4790	0.4040	0.4384	198
ENTERTAINMENT	0.4515	0.4806	0.4656	387
ENVIRONMENT	0.4773	0.5915	0.5283	355
FIFTY	0.3917	0.3114	0.3469	273
GOOD NEWS	0.5021	0.3869	0.4370	305
HEALTHY LIVING	0.3913	0.1865	0.2526	386
HOME & LIVING	0.6136	0.6788	0.6445	386
IMPACT	0.4011	0.3750	0.3876	400
MEDIA	0.6166	0.5089	0.5576	395
MONEY	0.5500	0.6111	0.5789	324
PARENTING	0.4384	0.4552	0.4467	391
POLITICS	0.4847	0.4524	0.4680	420
QUEER VOICES	0.6236	0.5349	0.5759	415
RELIGION	0.6372	0.6227	0.6299	440
SCIENCE	0.6778	0.5386	0.6003	414
SPORTS	0.6919	0.7122	0.7019	410
STYLE	0.5349	0.6489	0.5864	413
STYLE & BEAUTY	0.6070	0.7980	0.6895	391
TASTE	0.6483	0.7708	0.7043	397
TECH	0.5587	0.6178	0.5868	416
TRAVEL	0.6499	0.6691	0.6594	405
WEDDINGS	0.6938	0.7025	0.6981	400
WEIRD NEWS	0.4490	0.4534	0.4512	408
WELLNESS	0.4185	0.5553	0.4773	407
WOMEN	0.3843	0.4150	0.3990	400
WORLD	0.6780	0.6931	0.6854	404
accuracy			0.5446	12824
macro avg	0.5362	0.5366	0.5325	12824
weighted avg	0.5417	0.5446	0.5393	12824

News - bert-base-uncased

Epochs: 20, Batch Size: 64

Accuracy: 0.5446 F1-Score: 0.5393

- 1. Taste: 0.7043
- 2. Sports: 0.7019
- 3. Weddings: 0.6981

Confusion Matrix for Dense Embeddings

- 0.7

- 0.6

- 0.5

- 0.4

- 0.3

- 0.2

- 0.1

- 0.0

	BLACK VO	DICES -	2.35% <mark>0.0</mark>	0% 1.79%	1.79%	8.67%2	.81% 0.51	% 1.28%	8.93% 0.	26% 0.26	62.04%	0.00%	0.26% 2.	.04% 2.	04% 0.	51% 1.28	% 4.34%	1.79%	3.83% (0.00% 3.	32% 1.28%	2.55% 0.26	5% 0.26%	0.77% (0.00%2	.04% 0.5	1% 2.049	60.26%
	BUSI	NESS - 1	32%33.1	1 6%1 .84%	0.53%	2.11% 0	.79% 0.53	% 1.58%	0.26% 4.	47% 1.849	6 0.26%	1.05%	1.84% 2.	.63% 2.	63%13	68%0.79	% 3.42%	1.05%	0.53% (0.79% 0.	79% 1.58%	1.05% 1.05	% 8.16%	1.32%	0.00% 0	.79% 3.4	2% 3.169	1.58%
	COL	LEGE -	.19% 5.1	<mark>9%</mark> 49.06%	0.94%	1.89% 1	.42% 0.94	% 9.43%	0.00% 0.	94% 1.42	6 0.47%	1.89%	0.00% 1.	.42% 1.	42% 3.1	77% 0.00	% 1.42%	1.89%	0.94% (0.00% 0.	47% 0.94%	0.00% 0.47	% 0.00%	5 1.42% (0.47% 0	.47% 1.8	9% 3.77%	0.47%
	CO	MEDY -0	0.75% 0.5	0% 0.25%	34.59%	0.50% 3.	76% 1.00	% 0.25%]	12.28%1.	50% 1.00%	6 0.50%	0.75%	2.76% 0.	.00% 3.	26% 0.	25% 1.75	% 5.01%	0.75%	1.00% 1	.75% 2.	51% 5.01%	1.25% 2.26	5% 1.75%	1.25%	0.50% 7	.77% 0.5	0% 2.76%	6 0.25%
	c	CRIME -6	.60% 0.0	0% 1.22%	0.49%	i9.93% <mark>0</mark>	.49% 0.98	% 0.49%	0.24% 1.	22% 0.249	% 0.73%	0.49%	0.00% 0.	.98% 0.	49% 0	49% 0.24	% 1.22%	0.49%	1.71% (0.49% 0.	73% 0.00%	0.00% 0.00	1.47%	6 0.00% (0.24%5	.13% 0.2	4% 1.479	1.47%
	CULTURE &	ARTS -2	.82% 0.4	5% 0.15%	2.23%	0.30%58	.99%0.59	% 0.45%	4.31% 0.	15% 1.049	6 0.74%	0.30%	2.38% 1	.04% 0.	45% 0.	15% 1.04	% 0.00%	1.34%	1.04% 1	.19% 0.	74% 3.27%	1.78% 1.19	% 1.78%	2.38%	0.30% 2	.82% 0.8	9% 3.129	0.59%
	DIV	ORCE -0	0.72% 0.2	4% 0.48%	0.72%	0.95% 0	.72%55.39	0.24%	0.48% 0.	.00% 2.86	6 0.24%	0.24%	1.91% 0.	.24% 0.	24% 0.	95% 5.01	% 0.00%	1.43%	0.24% (0.00% 0.	24% 0.24%	2.86% 0.00	% 0.24%	0.72%	3.59% 0	.00% 1.4	3% 2.15%	6 0.24%
	EDUCA	TION -:	.52% 4.0	4%10.10%	60.00%	1.01% 2	.53% 0.00	<mark>%</mark> 40.40%	0.00% 0.	51% 1.019	6 0.00%	2.02%	0.00% 6.	.57% 0.	51% 6.	06% 6.06	% 3.54%	0.00%	3.03% 1	.01% 2.	02% 0.51%	0.51% 0.00	1% 2.02%	0.51%	0.00% 0	.00% 2.5	3% 1.529	0.51%
	ENTERTAIN	MENT -8	.27% 0.2	6% 0.26%	6.46%	0.26%6	.20% 2.58	% 0.00%	18.06% <mark>0</mark> .	.00% 0.26	6 0.26%	0.52%	0.00% 0.	.00% 2.	58% 0.	00% 1.03	% 1.55%	2.58%	0.00% (0.52% 2.	07% 8.53%	2.33% 0.26	i% 0.52%	0.52%	0.26%2	.07% 0.2	6% 1.559	0.00%
	ENVIRONI	MENT -	.85% 1.4	1% 0.00%	0.56%	2.25% 1	.69% 0.00	% 0.28%	0.28%59	.15% <mark>0.28</mark> 9	6 3.94%	0.85%	1.97% 3.	.94% 1.	69% 0.	28% 2.25	% 2.25%	0.56%	0.28%3	.94% 0.	56% 1.41%	0.28% 1.69	% 1.69%	6 0.85% (0.00% 1	.69% 1.1	.3% 0.28%	1.69%
		FIFTY -0	0.73% 1.8	3% 0.73%	1.10%	0.00% 1	.83% 2.20	% 0.37%	1.10% 0.	.00%31.14	%1.47%	7.69%	0.73% 1	.47% 0.	00%2.	93%10.6	2%1.10%	2.20%	0.37% (0.73% 0.	37% 3.30%	1.10% 2.56	5%2.20%	3.30% 3	3.30% 0	.73% 6.9	6% 5.869	0.00%
	GOOD	NEWS -2	.62% 0.3	3% 0.66%	0.98%	1.64% 2	.62% 0.33	% 0.98%	3.28% 4.	59% 1.97	<mark>6</mark> 38.69%	0.98%	0.66% 3.	.61% 0.	66% 0.	33% 5.57	% 0.33%	1.64%	1.31% 1	.64% 1.	97% 2.30%	0.00% 0.98	% 0.98%	6 0.98% (0.66%12	2.79%1.3	1% 2.30%	6 0.33%
	HEALTHY L	IVING -0	.78% 3.3	7% 0.52%	1.30%	0.26% 1	.04% 2.33	% 0.26%	0.26% 3.	37% 3.63	6 1.30%	18.65%	1.30% 5.	.18% 0.	26% 0.	52% 3.89	% 0.78%	0.78%	2.59%3	.37% 0.	26% 3.89%	0.00% 3.63	% 1.30%	0.26%	L.04% 2	.33%28.	76%2.59%	60.26%
	HOME & L	IVING -0	0.00% 0.5	2% 0.00%	1.04%	0.00% 3.	11% 0.26	% 0.26%	0.26% 1.	81% 0.52%	6 0.00%	0.26%	57.88% <mark>0</mark> .	.52% 0.	00%2.	07% 0.78	% 0.00%	0.00%	0.26% 0	0.00% 0.	00% 1.04%	7.51% 5.18	1.55%	0.78%	L.81% 0	.52% 2.0	07% 0.00%	0.00%
	IM	IPACT -2	.50% 3.7	5% 0.75%	0.25%	0.50%2	.00% 0.75	% 2.25%	0.50% 8.	50% 1.75	6 3.25%	1.25%	0.75% <mark>37</mark>	.50%0.	00%2.	75% 4.00	% 1.25%	1.25%	3.50% (0.00% 2.	00% 0.00%	0.25% 1.00	1% 2.00%	1.50%	0.75% 0	.75% 4.0	10% 5.00%	3.75%
s	N	IEDIA -3	.04% 1.5	2% 0.51%	6.58%	1.01% 2	.78% 0.25	% 0.51%	1.27% 0.	25% 0.00	6 0.00%	0.25%	0.00% 1.	.52%50	.89% <mark>0.</mark>	25% 0.25	%12.15%	1.01%	1.01% (0.51% 1.	77% 1.27%	0.51% 0.51	.% 3.29%	0.51%	0.00% 0	.76% 0.2	5% 2.53%	63.04%
ie Labe	м	ONEY -	0.00% 8.3	3% 1.23%	0.00%	1.23% 1	.54% 1.85	% 0.31%	0.00% 1.	54% 1.549	6 0.00%	0.31%	1.54% 2.	.16% 0.	31%51	.119 0.31	% 1.23%	0.31%	0.62%0	0.00% 0.	62% 0.00%	1.85% 1.85	i% 4.32%	2.16%	0.93% 0	.00% 1.8	5% 0.62%	0.31%
Ę	PAREN	TING -:	.28% 1.5	3% 0.51%	1.79%	0.51% 1	.02% 3.32	% 3.58%	1.02% 1.	79% 3.58	62.81%	1.53%	2.56% 3.	.84% 0.	26% 0.	77% 45.5	0.26%	0.77%	1.02% (0.26% 0.	77% 1.02%	2.05% 1.79	% 0.77%	6 0.51%	2.05% 0	.51% 5.6	3% 5.37%	0.00%
	POL	ITICS -3	.57% 3.5	7% 0.71%	3.10% :	3.57% 0	.95% 0.00	% 0.95%	0.95% 4.	29% 0.009	6 0.24%	1.19%	0.00% 2.	.14% 5.	00% 0	48% 0.71	<mark>%</mark> 45.249	1.19%	2.86% (0.71% 1.	90% 0.48%	0.24% 0.24	% 2.62%	0.24%	0.00% 1	.90% 0.4	8% 4.29%	6.19%
	QUEER VO	DICES -	.06% 0.0	0% 0.48%	1.93%	1.45% 2	.41% 2.17	% 0.24%	4.58% 0.	24% 1.69	6 1.20%	0.00%	0.72% 2.	.89% 0.	00% 0.	00% 0.9€	% 1.69%	53.49%	3.13% 0	0.24% 0.	24% 1.93%	1.69% 0.24	% 0.48%	0.96%	2.17% 0	.96% 1.2	0% 4.829	0.72%
	RELI	IGION -3	.64% 0.2	3% 0.45%	0.00%	2.27% 3.	18% 0.45	% 0.23%	0.45% 0.	.00% 1.59	6 0.68%	0.68%	1.14% 3.	.18% 0.	23% 0.	00% 0.91	% 2.05%	3.64%	2.27%	0.91% 0.	23% 0.23%	0.23% 0.23	% 0.91%	0.45%	0.00% 1	.14% 1.3	6% 2.27%	6 4.77%
	SCI	ENCE -0	0.00% 1.9	3% 0.72%	1.45%	0.24% 4	.11% 0.48	% 0.48%	0.48% 8.	45% 0.249	6 0.97%	4.35%	0.48% 0.	.24% 0.	24% 0.	24% 0.97	% 0.24%	0.00%	0.24%	3.86% <mark>0</mark> .	97% 0.97%	1.21% 1.45	% 2.90%	1.69%	0.24%3	.38% 5.0	7% 1.219	0.48%
	SP	ORTS -3	.17% 0.7	3% 0.49%	1.46%	1.95% 0	.98% 0.00	% 0.00%	1.71% 0.	73% 0.00%	6 2.20%	0.73%	0.00% 0.	.49% 1.	46% 0.	24% 0.49	% 2.20%	0.73%	0.24% (0.24%71	.22% 1.22%	0.00% 0.49	% 0.73%	0.98%	0.00% 1	.46% 0.4	9% 1.46%	b 1.71%
	-	STYLE - 1	.45% 1.2	1% 0.00%	0.48%	0.24% 1	.69% 0.00	% 0.00%	2.42% 0.	.00% 0.73	6 0.24%	0.48%	1.94% 0.	.24% 0.	73% 0.	73% 0.24	% 0.48%	0.48%	0.00% (0.73% 1.	21%54.89%	9.93% 1.69	% 0.97%	1.69%	L.21% 0	.97% 0.0	10% 2.91%	6 0.00%
	STYLE & BE	AUTY -0	0.00% 0.0	0% 0.26%	1.28%	0.00% 1	.02% 1.02	% 0.00%	1.28% 0.	.00% 0.519	6 0.00%	0.00%	3.07% 0.	.00% 0.	26% 0.	26% 0.26	% 0.00%	0.51%	0.00% (0.26% 0.	26% 3.84%	79.80% <mark>0.51</mark>	.% 0.51%	1.28%	L.53% 0	.26% 1.5	3% 0.519	0.00%
	٢	ASTE -0	0.00% 0.5	0% 0.00%	0.76%	0.00% 0	.50% 0.25	% 0.00%	0.76% 1.	26% 0.25	6 0.25%	0.50%	4.28% 1.	.01% 0.	00% 0.	50% 0.50	% 0.25%	0.00%	0.76% (0.50% 0.	25% 2.27%	1.01%77.01	8%0.00%	4.53%	0.50% 0	.76% 0.5	0% 0.25%	0.00%
		TECH -0	0.72% 5.7	7% 0.24%	0.96%	0.24% 1	.44% 0.96	% 0.96%	0.72% 2.	16% 0.009	6 0.48%	0.48%	0.96% 0.	.72% 2.	88%2.	40% 0.96	% 1.44%	0.96%	1.44% 1	.92% 0.	48% 1.92%	0.00% 0.00	1%51.789	0.48% (0.24%2	.88% 0.2	4% 1.20%	1.92%
	TF	RAVEL -0	0.49% 0.9	9% 0.74%	0.25%	0.49% 3.	95% 0.00	% 0.00%	0.99% 1.	73% 1.23	6 0.00%	0.00%	3.21% 0.	.99% 0.	00%2.	22% 0.25	% 0.00%	1.23%	0.25% (0.74% 0.	74% 1.23%	1.48% 3.70	0.99%	56.91%	L.23% 0	.49% 1.9	8% 0.49%	0.99%
	WEDD	DINGS -	0.00% 0.2	5% 0.25%	0.25%	0.00% 0	.50%12.50	1%0.00%	0.50% 0.	.00% 1.00%	6 0.00%	0.00%	1.50% 0.	.50% 0.	00% 0.	25% 2.75	% 0.00%	1.50%	0.00% (0.00% 0.	00% 0.50%	4.75% 0.25	i% 1.00%	6 0.50%	0.25%0	.00% 1.0	0% 0.00%	0.00%
	WEIRD N	NEWS -0	0.74% 0.4	9% 0.00%	2.45%	8.82%2	.21% 0.25	% 0.00%	1.96% 3.	19% 0.009	% 3.68%	1.47%	2.70% 0.	.00% 0.	74% 0.	25% 0.98	% 0.74%	0.74%	0.98% 2	.21% 3.	43% 2.94%	0.49% 5.15	% 3.92%	0.98% (0.98% 4	5.34% <mark>0.0</mark>	10% 1.72%	0.49%
	WELL	NESS - :	.23% 1.7	2% 0.00%	0.00%	0.98% 1	.47% 1.97	% 0.74%	0.49% 1.	97% 1.72	6 0.49%	1.23%	1.23% 4.	.67% 0.	49% 2.	95% 4.91	% 0.00%	0.25%	1.72% 1	.47% 0.	49% 0.00%	1.97% 3.69	% 0.98%	2.21%	0.98% 0	.98%55.	53%1.23%	0.25%
	W	DMEN -4	.75% 1.7	5% 1.75%	1.00%	0.75%2	.25% 3.50	% 0.25%	2.75% 0.	25% 1.75	6 1.00%	0.75%	0.25% 3.	.25% 1.	25% 0.	25% 4.25	% 2.75%	3.00%	1.75% (0.25% 1.	75% 5.50%	1.25% 0.25	% 0.75%	0.50%	L.50% 1	.00% 6.0	10% <mark>\$1.50</mark>	0.50%
	W	ORLD -0	0.50% 0.5	0% 0.25%	0.50%	3.47% 1	49% 0.25	% 0.00%	0.00% 3.	96% 0.25	6 0.25%	0.00%	0.25% 3.	.71% 1.	98% 0.	25% 0.00	% 2.23%	0.25%	3.96% 0	0.74% 0.	74% 0.25%	0.00% 0.00	% 1.49%	1.24%	0.50% 0	.74% 0.5	0% 0.50%	59.31%
			BLACK VOICES .	COLLEGE -	COMEDY -	CRIME -	CULTURE & ARTS - DIVORCE -	EDUCATION -	ENTERTAINMENT -	ENVIRONMENT -	GOOD NEWS -	HEALTHY LIVING -	HOME & LIVING -	IMPACT -	MEDIA .	MONEY -	POLITICS -	QUEER VOICES -	- RELIGION -	SCIENCE -	SPORTS - STYLE -	STYLE & BEAUTY - TASTE -	TECH -	TRAVEL -	WEDDINGS -	WEIRD NEWS	WELLINGSS -	WORLD -

bert-uncased-e20

googleN	lews-e15										
googleN	lews-e5	_	_	_	_	_	_	_	_	_	_
glove-e2	25			-							
glove-e2	20										
tf-idf-big	grams-e5										
w2v-e20)-w10-v300				0						
w2v-e20)-w5-v300										
tf-idf-e2	0										
tf-idf-e5											
0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55

Conclusion for the News Dataset

Best results: GoogleNews Embeddings Worst results: GloVe Embeddings

"Best" Category: Weddings (Home & Living, Taste)

Feedforward Neural Networks

Background:

Our Implementation:

(1) History of Neural Networks (2) What is a Feedforward Neural Network? (3) Training a FFNN (4) Strengths & Limitations (5) Model Setup (6) Author Classification (7) Language Identification (8) News Classification

(9) Sentiment Analysis

Sentiment - Tf-Idf Unigrams

- batch size: 32
- epochs: 20 * 5 = 100

Accuracy: 0.87 F1-Score: 0.87

For Each Category (F1-Score):

- negative: 0.87
- positive: 0.88

	precision	recall	f1-score	support
negative positive	0.88 0.87	0.87 0.88	0.87 0.88	4985 5015
accuracy macro avg weighted avg	0.87 0.87	0.87 0.87	0.87 0.87 0.87	10000 10000 10000

Sentiment - Tf-Idf Unigrams



Sentiment - Tf-Idf Bigrams

- batch size: 32
- epochs: 20 * 5 = 100

Accuracy: 0.87 F1-Score: 0.87

For Each Category (F1-Score):

- negative: 0.87
- positive: 0.88

	precision	recall	f1-score	support
negative positive	0.88 0.87	0.87 0.88	0.87 0.88	4985 5015
accuracy macro avg weighted avg	0.88 0.87	0.87 0.87	0.87 0.87 0.87	10000 10000 10000
Sentiment - Tf-Idf Bigrams



Sentiment - Word2Vec Embeddings

- batch size: 32
- epochs: 500 * 5 = 100

Accuracy: 0.59 F1-Score: 0.59

For Each Category (F1-Score):

- negative: 0.61
- positive: 0.57

	precision	recall	f1-score	support
negative positive	0.58 0.60	0.64 0.55	0.61 0.57	4985 5015
accuracy macro avg weighted avg	0.59 0.59	0.59 0.59	0.59 0.59 0.59	10000 10000 10000

Sentiment - Word2Vec Embeddings



Sentiment - GloVe Pre-Trained Embeddings

- batch size: 32
- epochs: 500 * 5 = 2500

Accuracy: 0.78 F1-Score: 0.78

For Each Category (F1-Score):

- negative: 0.78
- positive: 0.78

	precision	recall	fl-score	support
negative positive	0.78 0.78	0.77 0.78	0.78 0.78	4985 5015
accuracy macro avg weighted avg	0.78 0.78	0.78 0.78	0.78 0.78 0.78	10000 10000 10000

Sentiment - GloVe Pre-Trained Embeddings



Sentiment Classification - Overview

	Accuracy	Macro F1	Weighted F1
TF-IDF (Unigrams)	0.87	0.87	0.87
TF-IDF (Bigrams)	0.87	0.87	0.87
Word2Vec Embeddings	0.59	0.59	0.59
GloVe Embeddings	0.78	0.78	0.78

Conclusion for the Sentiment Dataset

Best results: Tf-Idf Unigrams / Bigrams Worst results: Word2Vec Embeddings

• Similar Classification Performance on Negative and Positive Labels.

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