Classification results for Orientation

Binary					
Method	Accuracy	Hyper Parameter Tuning	Precision	Recall	F1-Score
SVM	0.7934	'C': 1, 'kernel': 'linear'	0.6691	0.6591	0.6632
Random Forest	0.7448	'n_estimators': 10	0.5462	0.5106	0.4584
Logistic Regression	0.8041	'C': 10	0.6813	0.6666	0.6722
Multinomial Naive Bayes	0.7448		0.8510	0.5333	0.475
ANN using Word Tokenizer	0.7391		*0.00	*0.00	0.4138
ANN using Word Tokenizer (with removing **stopwords)**	0.7391		*0.00	*0.00	0.4138
ANN using GloVe & LSTM	0.7391		*0.00	*0.00	0.4138

Ternary					
Method	Accuracy	Hyper Parameter Tuning	Precision	Recall	F1-Score
SVM	0.5574	'C': 1, 'kernel': 'linear'	0.4837	0.5266	0.4930
Random Forest	0.5016	'n_estimators': 10	0.5340	0.4925	0.4722
Logistic Regression	0.5574	'C': 1	0.5370	0.5714	0.5453
Multinomial Naive Bayes	0.5148	0.5148	0.6424	0.4055	0.3785
ANN using Word Embedding					
ANN using Word Embedding (with removing **stopwords)**					

ANN using GloVe & LSTM	0.3043		0.5652	1.0000	0.6190

5-Point Scale					
Method	Accuracy	Hyper Parameter Tuning	Precision	Recall	F1-Score
SVM	0.4230	'C': 20, 'kernel': 'rbf'	0.2226	0.2687	0.2222
Random Forest	0.3508	'n_estimators': 10	0.4584	0.3272	0.3515
Logistic Regression	0.4328	'C': 5	0.3423	0.3107	0.3193
Multinomial Naive Bayes	0.3574		0.3595	0.2293	0.1890
ANN using Word Embedding					
ANN using Word Embedding (with removing **stopwords)**					
ANN using GloVe & LSTM	0.3304		0.8957	1.0000	0.7279

Classification results for Evaluation

Binary					
Method	Accuracy	Hyper Parameter Tuning	Precision	Recall	F1-Score
SVM	0.7097	'C': 20, 'kernel': 'rbf'	0.6962	0.6771	0.6690
Random Forest	0.6609	'n_estimators': 10	0.6962	0.6771	0.6690
Logistic Regression	0.6923	'C': 5	0.6678	0.6666	0.6660
Multinomial Naive Bayes	0.6087		0.6676	0.6145	0.5815
ANN using Word Embedding	0.5913		0.5913	1.0000	0.7432

ANN using Word Embedding (with removing **stopwords)**	0.5913		0.5965	1.0000	0.7432
ANN using GloVe & LSTM	0.6000		0.5965	1.0000	0.7432

Ternary					
Method	Accuracy (Validation)	Hyper Parameter Tuning	Precision	Recall	F1-Score
SVM	0.6098	'C': 20, 'kernel': 'rbf'	0.4467	0.4919	0.4638
Random Forest	0.5574	'n_estimators': 10	0.3570	0.4129	0.3824
Logistic Regression	0.6066	'C': 5	0.5175	0.5077	0.4989
Multinomial Naive Bayes	0.5475		0.4003	0.4555	0.3988
ANN using Word Embedding					
ANN using Word Embedding (with removing **stopwords)**					
ANN using GloVe & LSTM	0.1739		0.5913	1.0000	0.5887

5-Point Scale					
Method	Accuracy	Hyper Parameter Tuning	Precision	Recall	F1-Score
SVM	0.3443	'C': 10, 'kernel': 'rbf'	0.2763	0.2645	0.2168
Random Forest	0.3279	'n_estimators': 10	0.2834	0.2702	0.2641
Logistic Regression	0.3607	'C': 10	0.4096	0.4075	0.3817
Multinomial Naive Bayes	0.2820		0.4299	0.2907	0.2694

ANN using Word Embedding					
ANN using Word Embedding (with removing **stopwords)**					
ANN using GloVe & LSTM	0.1826		0.7739	1.0000	0.6544

My Thoughts:

I have chosen those models (if I need to choose one for each of the tables) which is marked by GREEN colors. At first, I looked for **F1-Score** than **accuracy** because it works well when our data is imbalanced. But I have a doubt on ternary classification for **evaluation** due to **little accuracy** which is using "**ANN using GloVe & LSTM**" model.

Asterisk (*) sign indicated I need to look it again what's the exact reason for showing these values.

The main reason for the little accuracy of my deep learning models is that I have used to train my model only by using the **text** parameter as input & due to small data-set. If I can use **multiple parameters** as **inputs** then It will be a good model in terms of accuracy & F1-Score.

From those tables, Some of the Deep Learning Models have no result. After classifying by orientation I thought that there is no need to go with them due to little accuracy but further I realized **F1-Scores** can good impact over accuracy.

Future Improvements:

I have applied these three (Word2Vec, GloVe, Count Vectorization) word embedding methods in this dataset so far. Due to lack of data, I couldn't get good scores. And these methods ain't context-sensitive embeddings. So, I think, I should apply ELMo & BERT as well or similar types of algorithms. Or I can use some kinds of **scoring algorithms** that are used in this (A Hybrid Approach for Sentiment Analysis Applied to Paper Reviews) paper.

Model Name	Context-sensitive embeddings	Learned representations
Count Vectorization	No	words
Word2Vec	No	words

GloVe	No	words
ELMo	Yes	words
BERT	Yes	sub-words
…….. ……..		

Fig-1: Word Embedding Technics

It would be better if I could build similar types of Model (Fig-2) by using Tensorflow. I tried but failed for mismatching tensors while executing the model for training purposes. I need to learn more in order to fix it up.

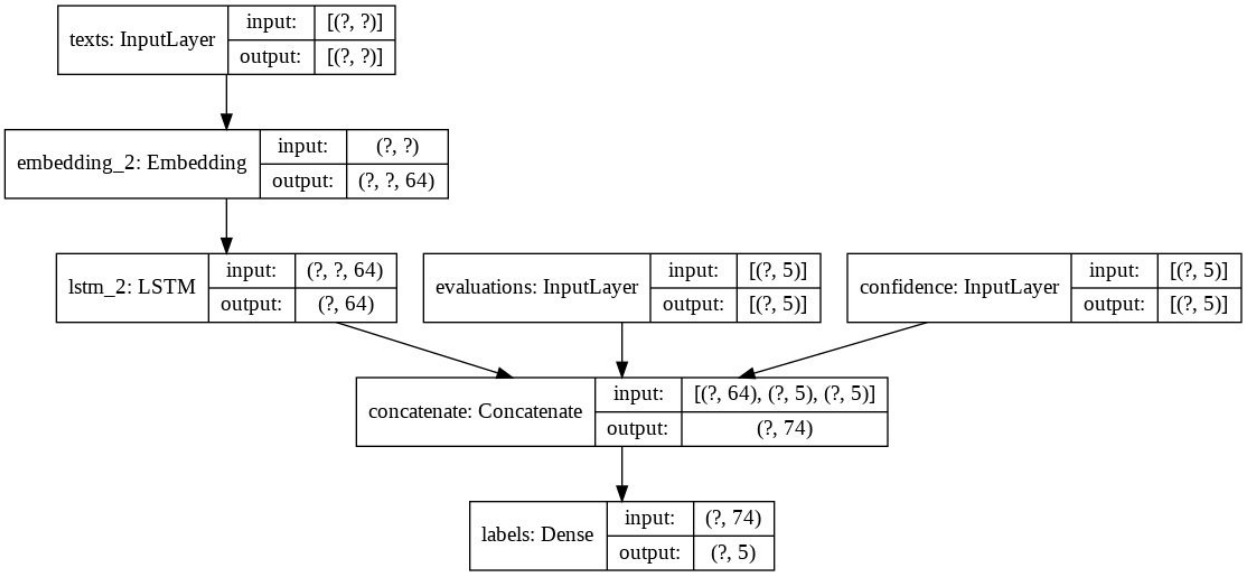

Fig-2: Multilayer Inputs Sample (for ANN)

Used Framework/Library/API: Tensorflow, Scikit Learn, Keras, Matplotlib, Seaborn, Pandas, NLTK

Finally, I tried my best to prove myself for getting an opportunity to work with you. However, I strongly believe that I can do better than that.