Named Entity Recognition System for Government Services

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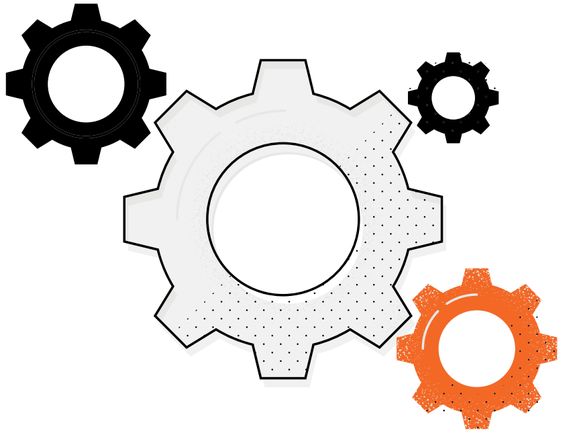
Problem Statement

Government services and authorities are interested in getting feedback about their services in an automated fashion to work on enhancing quality of life for the citizens.

We used Twitter tweets to built a Neural Network model that achieve Named Entity Recognition for the Goverment services.

What Is NER?



Named-entity recognition:

- Information extraction technique
- Locate and classify named entities
- Pre-defined labels specific for government services ex: وزارة الدفاع، وزارة الداخلية، توكلنا

Methodology

- Label, Clean & preprocess SDAIA's Arabic NER Data
- Build Bi-LSTM Model
- Train & Evaluate Model
- Fetch Tweets via API
- Predict
- Serve Model Results

The Model

Input

13000 clean and preprocessed tokens

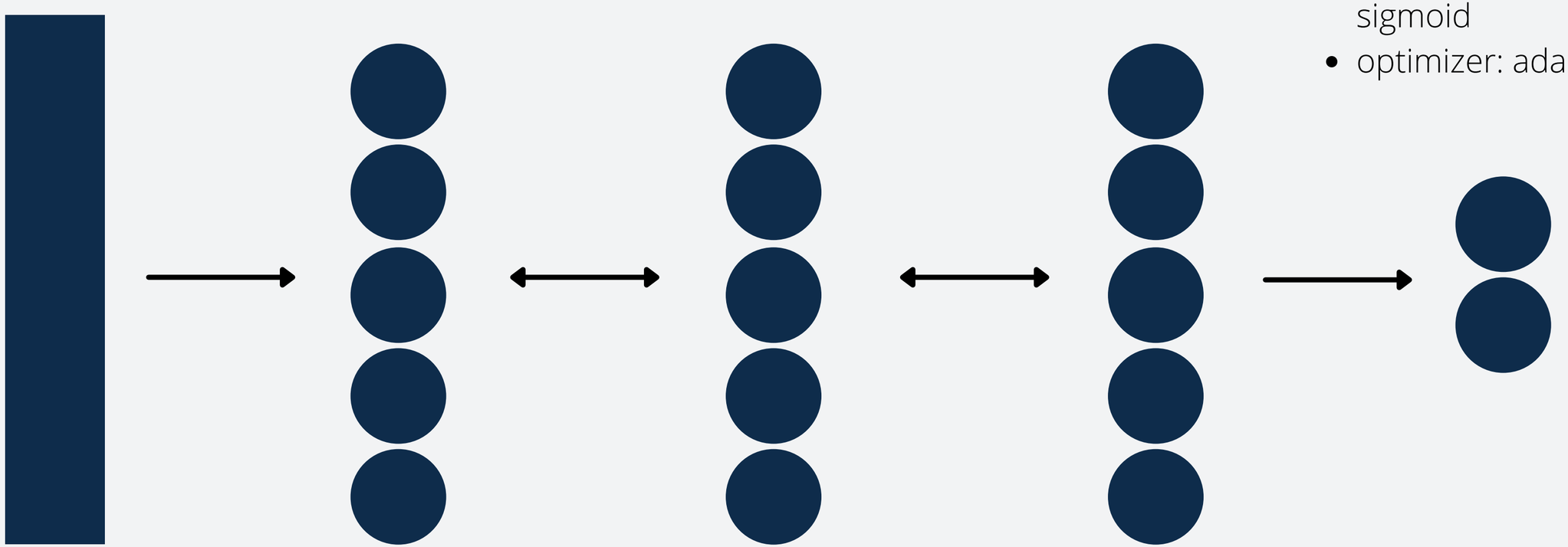
Embedding layer

BI-LSTM

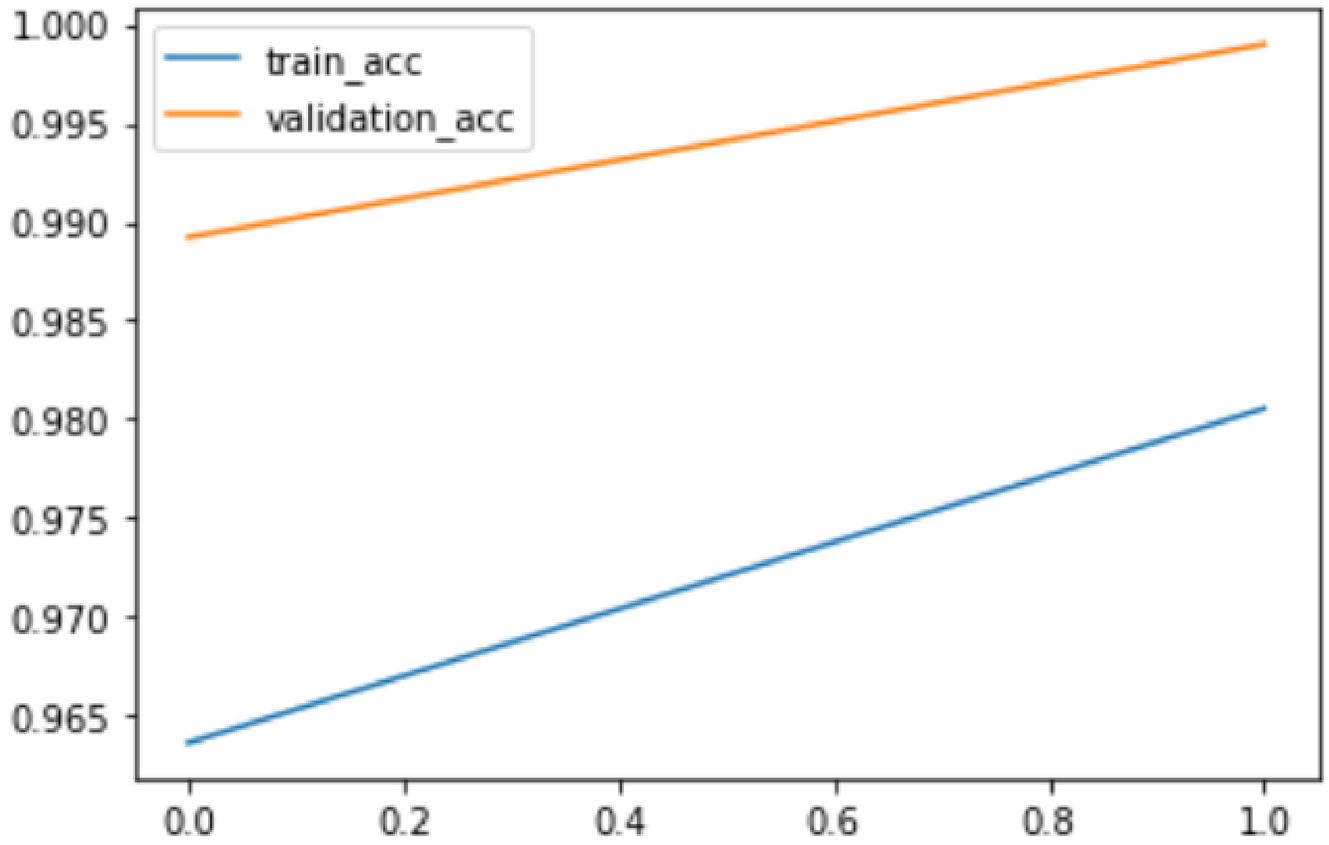
LSTM

Output

- activation function: sigmoid
- optimizer: adam



Results on Test vs Validation sets



Results on unseen data

	precision	recall	f1-score	support
0	1.00	1.00	1.00	9858
1	1.00	1.00	1.00	9522
accuracy			1.00	19380
macro avg	1.00	1.00	1.00	19380
weighted avg	1.00	1.00	1.00	19380

Challenges

- Tensorflow version issues

- **The Dataset provided is:**
  - Too small for the purpose of Deep Learning
  - Not tokenized nor labeled
  - Imbalanced classes

- The Government Services Titles can be used in different context
- In Production, new words are fed to the model which results in false classification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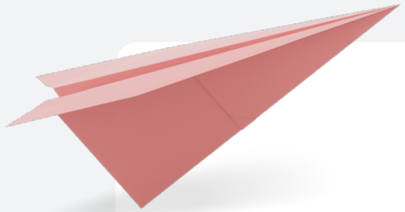
What's Next in for Future Work

- Add more and detailed government entity labels in a random fashion.
- Improve the labeling to include specific government services.
- Develop more features like highlighting Named Entites in the Tweets.
- Apply Sentiment Analysis on the Tweets.

Conclusion

We should have utilized transfer learning, pre trained model, since they are trained in millions of words hence should produce more accurate results



Do you have any questions?

THANK YOU