ElConsulto Task Documentation

Overview

This system uses **Arabic BERT**, a pre-trained transformer model designed for Arabic text, to generate embeddings. These embeddings are then used to train a classifier (Logistic Regression, SVM, or Random Forest) to categorize the text as "Distressed" or "Non-Distressed."

The application includes:

- **Arabic text preprocessing** (to normalize and clean the text).

- **Arabic BERT** for text representation.

- **Machine Learning classifiers** for distress classification.

- A **Gradio interface** for easy interaction with the chatbot.

Installation Instructions

1. **Clone this repository** or download the source code.

2. git clone https://github.com/nadchhe/Elconsulto_task.git

3. cd Elconsulto_task

4. **Install required dependencies** using pip:

5. pip install torch transformers scikit-learn seaborn gradio matplotlib

6. **Run the script** to launch the chatbot interface:

7. python app.py

The Gradio interface will open in your web browser, where you can interact with the chatbot.

Data

The model is trained on a **small Arabic dataset** with messages categorized into two labels:

- **Distressed**: Messages indicating emotional distress or mental health concerns.

- **Non-Distressed**: Regular messages showing positive or neutral emotions.

Example distressing messages:

- "أنا مخنوق ومش قادر أتنفس" ("I feel suffocated and can't breathe")

- "حاسس بضيق شديد ومش لاقي أي أمل" ("I feel a great pressure and can't find any hope")

Example non-distressing messages:

- "أنا كويس النهارده" ("I'm fine today")

- "يوم عادي ومفيش حاجة تقلق" ("Just a normal day, nothing to worry about")

How It Works

1. **Preprocessing**:

   - The Arabic text is cleaned and normalized (such as converting different forms of Arabic letters into a standard format).

2. **BERT Embeddings**:

   - The text is tokenized and passed through **Arabic BERT** to get embeddings (vector representations).

3. **Model Training**:

   - We train three machine learning models: **Logistic Regression**, **SVM**, and **Random Forest** on the extracted embeddings.

   - Hyperparameter tuning is performed using **GridSearchCV** to optimize the models.

4. **Prediction**:

   - Once the models are trained, they are used to predict whether a new message is distressed or non-distressed.

5. **Gradio Interface**:

   - The chatbot is hosted via **Gradio**, where users can type Arabic messages to receive distress predictions.

Evaluation

The models are evaluated using the **F1-score** (weighted), and a **confusion matrix** is displayed for each model to visualize how well they classify the test data.

- **Precision**, **Recall**, and **F1-Score** are the key metrics used for evaluation.

- A confusion matrix helps to visualize the performance, indicating how well each model identifies both classes ("Distressed" and "Non-Distressed").

Limitations

- **Small Dataset**: The dataset used for training is small (20–30 samples per class), which may not generalize well to real-world data. A larger, more diverse dataset would improve model robustness.

- **Model Choices**: While **Arabic BERT** provides strong text representations, the simple classifiers (Logistic Regression, SVM, and Random Forest) may not capture all nuances of complex mental health-related language. A more advanced model (e.g., fine-tuning BERT) could yield better results.

- **Ethical Considerations**: Although the model provides predictions, it should not be used as a sole decision-making tool in sensitive mental health situations. Further ethical considerations should be implemented in a real-world application, such as alerting a mental health professional when distress signals are detected.

Future Improvements

1. **Fine-tuning BERT** on a larger mental health dataset to improve prediction accuracy.

2. **Expanding the dataset**: Including a wider variety of distress and non-distress messages would help the model generalize better.

3. **Error handling**: Implementing automatic checks to ensure the chatbot doesn't mislabel sensitive messages.

Example Usage

1. **Input**: "حاسس بضغط ومفيش فايدة"
   Output: Distressed

2. **Input**: "النهارده الجو جميل ومرتاح"
   Output: Non-Distressed

Authors & Acknowledgements

- **Model**: Arabic BERT (asafaya/bert-base-arabic from Hugging Face)

- **Libraries**: Hugging Face Transformers, PyTorch, scikit-learn, Gradio, Matplotlib