NLU FINAL PROJECT PROPOSAL

INTENT CLASSIFICATION USING ATIS DATASET FOR NATURAL LANGUAGE UNDERSTANDING

Intent classification is a task in Natural Language Understanding (NLU) that identifies the purpose of a user's query. In an airline booking system, typical intents include "BookFlight," "FlightStatus," and "GroundService." By categorizing user inputs, the system can accurately respond to requests such as booking tickets, checking flight statuses, or asking about ground services. The ATIS (Airline Travel Information Systems) dataset, which contains airline-related queries labeled with intent categories, is commonly used to train models for chatbots and virtual assistants handling travel-related inquiries.

Purpose:

This project explores the performance of various models for intent classification on the ATIS dataset. The approach includes:

Traditional Machine Learning Models: Naive Bayes and Logistic Regression

Neural Networks: A Convolutional Neural Network utilizing pre-trained GloVe embeddings to capture semantic information from text.

Transformer Models: Fine-tuned BERT(Bert-base-cased) to leverage state-of-the-art language understanding capabilities.

The goal is to compare the performance of these models using metrics such as accuracy and F1 score. The inclusion of fine-tuned BERT allows an evaluation of how advanced transformer models can improve intent classification over traditional and simple neural network approaches.

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Question this project will address: How accurately can Naive Bayes, Logistic Regression, CNNs with pre-trained embeddings, and fine-tuned BERT models classify user intent in airline-related queries using the ATIS dataset?

Dataset Link: https://huggingface.co/datasets/pfsv/atis_json

Project Approach:

- **Data Collection:** I will be using the ATIS dataset from Hugging Face, which contains airline travel queries tagged with intent labels.
- **Model Implementation:** I will implement and train three models—Naive Bayes, Logistic Regression, and a Neural Network—for intent classification.
- **Evaluation:** Each model's performance will be evaluated based on classification accuracy and F1-score. Additionally, I will assess the models' strengths and weaknesses in handling intent classification tasks in the NLU context.