ATIS Chatbot: Mid-Term Evaluation

Laconia Team Project

Muqtadir A, Nikhil Madduru, Karthik Mikkelineni

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Project Goal: Build an intelligent chatbot for airline travel queries

Project Overview

Team and Objective

- **Team**: Laconia
  - Nikhil Madduru
  - Karthik Mikkelineni
  - Muqtadir A
- **Objective**: Develop a chatbot for ATIS queries

Key Features

- **Key Features**:
  - Intent classification (8 intents)
  - Entity extraction (cities, dates)
  - Slot filling for dynamic responses

Technology Stack

- **Technology Stack**:
  - Python 3.10, CUDA 12.1 (RTX 4060, with CPU fallback)
  - DistilBERT (intent classification)
  - Rasa 3.6.21 (planned framework)

Status and Repository

- **Status**: Groundwork complete, Rasa implementation in progress
- **Repository**: `https://github.com/NikhilMadduru23/Laconia-Project`

Technical Achievements

Dataset Preparation

- **Dataset Preparation**:
  - ATIS dataset processed (`atis_train.csv`, `atis_test.csv`)
  - 8 intents: abbreviation, aircraft, airfare, airline, flight, flight_time, ground_service, quantity
  - Entities: cities, dates, airlines

Model Development

- **Model Development**:
  - DistilBERT trained with `transfer_learner.py`
  - 99% accuracy on test set
  - CUDA support on RTX 4060

Environment Setup

- **Environment Setup**:
  - Python 3.10 virtual env (`rasa_env`)
  - Dependencies in `requirements.txt`

Rasa Implementation [In Progress]

- **Design Completed**:
  - Pipeline: `WhitespaceTokenizer`, `DistilBertIntentClassifier`, `DIETClassifier`
  - Domain: 8 intents, 4 slots (`domain.yml`)
  - NLU: Entity annotations (`data/nlu.yml`)
  - Rules: Simplified mappings (`data/rules.yml`)
  - Action: Slot filling (`actions/actions.py`)
- **Status**: Partially coded, full implementation pending
- **Goal**: Functional chatbot with intent classification, entity extraction, and slot filling

Challenges Faced: Dependency Management

- **Dependency Management**:
  - Resolved conflicts (e.g., `numpy`, `torch`)
  - CUDA 12.1 compatibility mitigated with fallback

Challenges Faced

Dataset Processing

- **Dataset Processing**:
  - Handled missing data in ATIS dataset
  - Subsampled for efficiency

Technical Setup

- **Technical Setup**:
  - Overcame Windows-specific issues with Python 3.10

CUDA Fallback

Issue

- **Issue**: CUDA 12.1 (`cu121`) not supported on some systems

CPU and Alternate CUDA Solutions

- **CPU-Only**: Install `torch==2.5.1`:

```
pip install torch==2.5.1 --no-cache-dir
```

- **Alternate CUDA**: Use CUDA 11.8 (`cu118`):

```
pip install torch==2.5.1+cu118
    --index-url
        https://download.pytorch.org/whl/cu118
```

Code Update

- **Code Update**: In `transfer_learner.py`, set:

  `fp16=False`

- **Impact**: Ensures compatibility across hardware

Next Steps

Rasa Integration

- **Rasa Integration**:
  - Complete pipeline integration
  - Finalize slot filling and flows

Testing and Enhancements

- **Testing**:
  - Validate intent and entity accuracy
  - Test multi-turn interactions
- **Enhancements**:
  - Add Flask frontend
  - Explore BART summarization

Timeline

- **Timeline**:
  - Rasa completion by 20-04-2025
  - Project end by 28-04-2025

Conclusion

- **Summary**: Laconia team established strong foundation
- **Progress**: Rasa designed, partially coded
- **Future**: Finalize Rasa, test, enhance
- **Questions?**: Open for feedback