Work Integrated Learning Programmes Division
M.Tech. in AIML
NLP Applications
S1-25_AIMLCZG519

Assignment 1 – PS-10

General Instructions :

1. **The experiment is preferred to be conducted on the BITS OSHA Cloud Lab.**
2. **Attach a screenshot of the OSHA Lab portal that displays the student's credentials as proof of access and usage.**
3. **No extension on the deadline**
4. **Any queries regarding this problem statement should be addressed to Vasugi I, vasugii@wilp.bits-pilani.ac.in (Course LF)**

PART A

Problem Statement: Knowledge Graph Application

Objective

Develop a web-based Knowledge Graph application that allows users to input and visualize relationships between entities. The application should offer a user-friendly interface to add relationships, query the graph, and display the results dynamically.

Requirements

Front-end Development (3 Marks)

- Design a web-based front end using a framework of your choice
- Provide user input fields to add entities and their relationships.

User Input

- Enable users to:
  - Manually enter entity–relationship pairs through text fields, or
  - Upload datasets in **CSV format** for bulk input.

- **Use Case for Input:**
- **E-Commerce Product Network** – capturing relationships between products, categories, sellers, and customer reviews
- Include dedicated fields for:
    - Entity 1
    - Relationship
    - Entity 2

- Allow users to query the graph and visualize the results.

Visualization

- Display the Knowledge Graph visually within the webpage.
- Ensure the visualization updates dynamically whenever new relationships are added.

Graph Management and Querying (3 Marks)

Backend Implementation

- Use **Flask** to build the backend for managing requests and responses.
- Use **NetworkX** to construct, update, and query the Knowledge Graph.

Functionality

- Implement API endpoints to:
    - Add relationships
    - Query the graph and return results

Integration (2 Marks)

- Integrate the front end and back end into a cohesive application.
- Process user inputs, update the graph accordingly, and return the results.
- Display graph updates and query outputs in a clear, user-friendly manner.

Task B: Enhancement Plan (2 Marks)

Provide detailed documentation that outlines how the Knowledge Graph application can be improved to provide a more efficient, scalable, and user-friendly mechanism for handling entity-relationship inputs, when working with large or complex datasets in an E-Commerce Product Network

PART B

Literature Survey (5 Marks)

Topic : "Advancements in Retrieval-Augmented Generation for Knowledge-Enhanced Language Models"

Deliverables:

PART - A

- A well-documented code (Python and frontend) for the knowledge graph application.
- Instructions for running the application locally.
- A brief report explaining the design choices and any challenges faced during implementation.
- A set screenshots that explains the entire flow of the application to be included in the report.
- Task-B to be submitted as a .pdf document.

PART – B

A well-documented literature review to be presented as a .pdf document