Report on one-week Faculty Development Programme (FDP) on Natural Language Processing (NLP)

Date: 3rd June-7th June 2024   **Venue: First floor 150 Lab**

The one-week Faculty Development Program (FDP) on Natural Language Processing (NLP) was held from 3rd June to 7th June 2024. The program aimed to equip faculty members with foundational and advanced knowledge in NLP, a rapidly growing field with significant applications in academia and industry. The FDP covered key NLP concepts, data pre-processing techniques, core and advanced NLP models, and practical applications.

Dr.S.Srinivasa Rao, Principal, MRCET, Dr.T.Venugopal, Dean, MRECT and Dr.S.Shanthi,HOD-CSE, has formally inaugurated the faculty development programme with lightning the lamp. The resource persons are Mr. Naga Sri Mouli Borusu, Industry Expert, Mr K. Naga Kumar, CEO, Devspark IT Solutions and Dr.S Karthik, Assoc.Professor, SRM University, Chennai.

Objectives

- To provide participants with a comprehensive understanding of NLP fundamentals and advanced techniques.
- To enhance participants' ability to apply NLP methods in research and teaching.
- To familiarize participants with practical tools and libraries used in NLP.

Day 1: Introduction to NLP

- **Overview of NLP**
  - Definition and significance of NLP
  - History and evolution of NLP
  - Real-world applications (e.g., chatbots, sentiment analysis, translation)
- **Basic Concepts**
  - Tokenization
  - Part-of-speech tagging
  - Named Entity Recognition (NER)
- **Hands-on Activity**
  - Basic text processing using Python and libraries like NLTK or SpaCy

Day 2: Data Preparation and Preprocessing

- **Text Data Preprocessing**
  - Cleaning and normalization
  - Stop words removal
  - Lemmatization and stemming
- **Feature Extraction**

- o Bag of Words (BoW)
- o Term Frequency-Inverse Document Frequency (TF-IDF)
- o Word embeddings (Word2Vec, GloVe)
- **Hands-on Activity**
  - o Implementing preprocessing and feature extraction using Python

Day 3: Core NLP Techniques

- **Machine Learning Basics for NLP**
  - o Supervised vs. unsupervised learning
  - o Classification and regression
- **NLP Models and Algorithms**
  - o Naive Bayes, SVM, and Logistic Regression for text classification
  - o Clustering techniques (e.g., K-means)
- **Hands-on Activity**
  - o Building and evaluating a text classification model

Day 4: Advanced NLP Models

- **Deep Learning for NLP**
  - o Introduction to neural networks and deep learning
  - o Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks
  - o Transformers and BERT
- **Hands-on Activity**
  - o Using pre-trained models like BERT for text classification or named entity recognition

Day 5: Applications and Tools

- **Applications of NLP**
  - o Sentiment analysis
  - o Text generation (e.g., GPT models)
  - o Machine translation
- **Popular Tools and Libraries**
  - o TensorFlow, PyTorch for deep learning
  - o Hugging Face's Transformers library
- **Hands-on Activity**
  - o Implementing a sentiment analysis or text generation project

Outcome of the programme:

- Faculty will gain in-depth knowledge of fundamental NLP techniques, including tokenization, stemming, lemmatization, part-of-speech tagging, and named entity recognition.

- Faculty will learn **text preprocessing, sentiment analysis, text classification, and topic modeling**, enabling them to apply these techniques in research and teaching.

- Understanding the role of **Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM), GRUs, and Transformer models like BERT and GPT** in NLP applications.

- Understanding applications such as **chatbots, machine translation, speech recognition, information retrieval, and automated text summarization**.

- Faculty members will be encouraged to **develop NLP-based research projects, collaborate with industry partners, and apply for funding opportunities** in AI and NLP

Conclusion

The FDP on NLP successfully achieved its objectives, providing faculty members with valuable knowledge and skills in a critical and evolving field. The program was well-received, with positive feedback highlighting its practical approach and the expertise of the trainers.
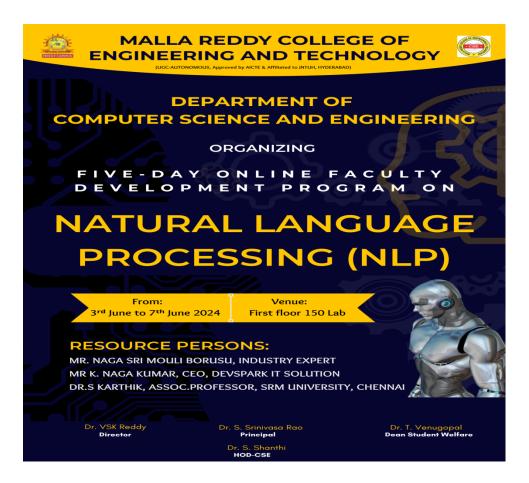
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