**National University of Computer and Emerging Sciences, Karachi Campus**



## **AI-Driven Job-Resume Matching System**

[**AI-2005 Artificial Intelligence**](https://classroom.google.com/c/NjU3MjY0OTUxOTYx)

**Project Report**

**BS (CS) – J**

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**Objective:**

The objective is to create an AI-driven platform that leverages sophisticated machine learning techniques to automate the job application process by matching job postings with candidate resumes. This system aims to enhance the recruitment process for employers and assist job seekers in efficiently finding suitable positions.

**Introduction:**

The recruitment industry is increasingly incorporating artificial intelligence to streamline processes, yet the challenge of matching job vacancies with the appropriate candidates efficiently remains. Traditional manual methods, which are time-consuming, often overlook potential candidates. Our AI-driven Job-Resume Matching System leverages advanced AI techniques to automate and refine the matching process, thereby reducing recruitment time and resources and increasing the accuracy of matches.

**Description and Technical Details:**

The core of our proposed system is a customized Named Entity Recognition (NER) model developed to specifically identify and tag skills within resumes. This model is powered by DistilBert, a streamlined version of the BERT (Bidirectional Encoder Representations from Transformers) model, known for its efficiency and effectiveness in processing natural language data.

**DistilBert Integration:**

* **Tokenizer and Model Usage:** We employ the `DistilBertTokenizer` and `DistilBertModel` from the Hugging Face's Transformers library. The tokenizer breaks down text into tokens that can be processed by the model. This process is essential for preparing data for the NER model, which identifies specific entities like skills within the text.
* **Customization with Manually Annotated Data**: The NER model has been further customized with manually annotated datasets where skills are explicitly tagged. This allows the model to learn from a tailored dataset, enhancing its ability to accurately extract skills from resumes and job descriptions.
* **Skill Extraction Process:** Once the documents are tokenized, the DistilBert model processes these tokens to predict the likelihood of each token being part of a skill entity. The extracted skills are then used to match candidates with job descriptions based on the relevance of extracted skills to those required by the job.

**System Operations:**

* **Job Listings and Resumes Hosting:** Providing a centralized platform for employers and job seekers to access job listings and upload resumes.
* **Candidate Ranking:** Utilizing the skills extracted by the customized NER model to automatically rank candidates based on the similarity of their skills and experience to job requirements.
* **Interactive User Interface:** A user-friendly interface that includes:
  + A display of extracted skills for both job descriptions and resumes.
  + Graphical and tabular representations of the similarity between job requirements and candidate profiles.
  + A document management interface where users can upload and manage their applications and documents.

**Technologies Used:**

* **Machine Learning & NLP:** Customized NER model and Hugging Face's Transformers such as DistilBert.

**Planned Improvements:**

* **Expand Entity Recognition:** Enhance the NER model to identify and tag a broader range of entities, including educational background, certifications, and other relevant details, to improve the richness of profile data used for matching.
* **Continuous Model Training:** Regular updates and retraining of the NER model with new, manually annotated data to improve its accuracy and adaptability to changing job market trends.
* **Algorithm Enhancement:** Development of more advanced algorithms to further refine the precision of the matching process.

**Conclusion:**

The AI-Driven Job-Resume Matching System is set to revolutionize recruitment technology. By harnessing the power of tailored AI and machine learning, it promises to make the recruitment process more streamlined, effective, and aligned with the needs of modern job markets.

**References:**

[**https://medium.com/hr-ai/named-entity-recognition-how-to-extract-skill-entities-from-resumes-using-spacy-865476b5771e**](https://medium.com/hr-ai/named-entity-recognition-how-to-extract-skill-entities-from-resumes-using-spacy-865476b5771e)

[**https://tecoholic.github.io/ner-annotator/**](https://tecoholic.github.io/ner-annotator/)