CS 5100
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# Project Proposal

## 1.1 Introduction

Project Goal:
Develop an AI-powered tool that enhances resumes by analyzing content, structure, and alignment with job listings, increasing applicants chances of ranking higher in the Applicant Tracking Systems (ATS).

What are you working on in this project?:
A tool that provides applicants with feedback on keyword optimization, phrasing, and overall resume effectiveness to improve their chances of passing the initial ATS screening. This tool also offers personalized suggestions on skills to develop based on industry trends and job requirements.

Why are you working on this project?:
As we approach the end of our graduate program, we're actively exploring job listings for full-time positions. In a challenging economy like the one we're in, we recognize the need for a tool that can help both us and others navigate the job search more effectively. This project aims to provide support by improving resumes and increasing job application success.

On what field(s) can your project have an impact?:
This project can impact career development and recruitment by helping job seekers improve their resumes and increase their chances of employment. It also benefits recruiters by enhancing the resume screening processes and streamlining talent acquisition. This project will benefit both parties tremendously by saving time, being more confident.

## 1.2 Previous Work and Contributions

Paper 1:
*A Comparative Study of Keyword Extraction Algorithms for English Texts*
Li, Jinye
2021

- Contribution: Evaluated various keyword extraction methods, including an improved TF-IDF algorithm for better relevance ranking
- Highlight:Demonstrated that enhanced TF-IDF techniques can significantly improve text summarization and keyword matching.

- Limitation: The study focused primarily on English text and lacked adaptability to domain-specific job-market trends.

Paper 2:
*ResumeFlow: An LLM-facilitated Pipeline for Personalized Resume Generation and Refinement*
Saurabh Bhausaheb Zinjad, Amrita Bhattacharjee, Amey Bhilegaonkar, Huan Liu
2024

- Contribution: Created a pipeline using large language models (LLMs) to personalize and refine resumes based on job postings.
- Highlight: Showed that LLM-generated resumes improved recruiter preference rates compared to manually edited resumes.
- Limitation: LLM-generated content occasionally introduced inaccuracies, requiring human verification to prevent false claims.

Contribution 1:
Dynamic ATS Keyword Integration

- Use job postings to update industry-specific keyword libraries in real time.
- Compare TF-IDF vs. BERT embeddings for keyword relevance

Contribution 2:
Bias-Aware language Suggestions:

- Integrate HuggingFace Bias Detection Toolkit to flag biased language
- Suggest neutral alternative using GPT-4

Methodology:

- Use BERT to extract entities and contextualize them with job descriptions
- Use GPT-4 to refine the resume for conciseness
- Reduce hallucinations by implementing prompt engineering

## 1.3 Expected Results

### Expected Results:

- Resumes optimized by the tool to achieve 30% higher ATS scores tested by professional resume ATS scoring website.
- Resumes after modification by the tool do not hallucinate content not included in the original resumes. The tool will be able to have the user make suggestions/ active editing before yielding the final result (e.g. ChatGPT Canvas).

Citation

Li, Jinye. (2021). *A comparative study of keyword extraction algorithms for English texts.* ResearchGate. Retrieved from https://www.researchgate.net/publication/353149952_A_comparative_study_of_keyword_extraction_algorithms_for_English_texts

Saurabh Bhausaheb Zinjad, Amrita Bhattacharjee, Amey Bhilegaonkar, Huan Liu. (2024). *ResumeFlow: An LLM-facilitated pipeline for personalized resume generation and refinement.* arXiv. Retrieved from https://arxiv.org/abs/2402.06221

*We are still actively reading the paper and trying to form a better idea around this project. For 1.2 previous work and contribution part, we need more time and guidance to complete the section. Please excuse us for this draft proposal. We will improve it over the course of learning more about our topic.*