

A SYNOPSIS ON

Tailored CV for Jobs

Submitted in partial fulfilment of the requirement for the
award of the degree of

MASTER OF COMPUTER APPLICATIONS

(OMC207 Mini Project, Second Semester MCA)

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CANDIDATE'S DECLARATION

I/we hereby certify that the work which is being presented in the Synopsis entitled "**Tailored CV for Jobs**" in partial fulfilment of the requirements for the award of the Degree of Master of Computer Applications (OMC207 Mini Project, Second Semester MCA) in the Department of Computer Applications of the Graphic Era (Deemed to be University), Dehradun shall be carried out by the undersigned under the supervision of Guide Name, Designation, Department of Computer Applications, Graphic Era (Deemed to be University), Dehradun.

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Internal Evaluation (By DPRC Committee)

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Name of the Committee Members:

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Chapter 1: Introduction and Problem Statement

1.1 Introduction

In today's highly competitive job market, standing out from the crowd is more critical than ever. Job seekers are constantly striving to make their applications more appealing to potential employers. One of the most effective ways to enhance an application's impact is through a well-crafted resume. However, creating a resume that is not only informative but also tailored to specific job descriptions poses a significant challenge for many applicants.

The Resume Tailoring

Application is an innovative solution designed to address this challenge. This application leverages advanced natural language processing (NLP) capabilities of the GPT-4 model to assist users in customizing their resumes according to the requirements

of specific job descriptions. Developed using the Streamlit framework, the application offers a user-friendly interface that simplifies the process of resume tailoring, making it accessible even to those with minimal technical expertise.

The core functionality of the application revolves around its ability to analyze both the user's original resume and the provided job description. By understanding the key skills, experiences, and qualifications highlighted in the job description, the application generates a revised version of the resume that emphasizes the most relevant aspects. This not only helps job seekers present themselves more effectively but also increases their chances of passing through automated applicant tracking systems (ATS) and catching the attention of hiring managers.

LIVE DEMO

The live demo of this application can be found at :

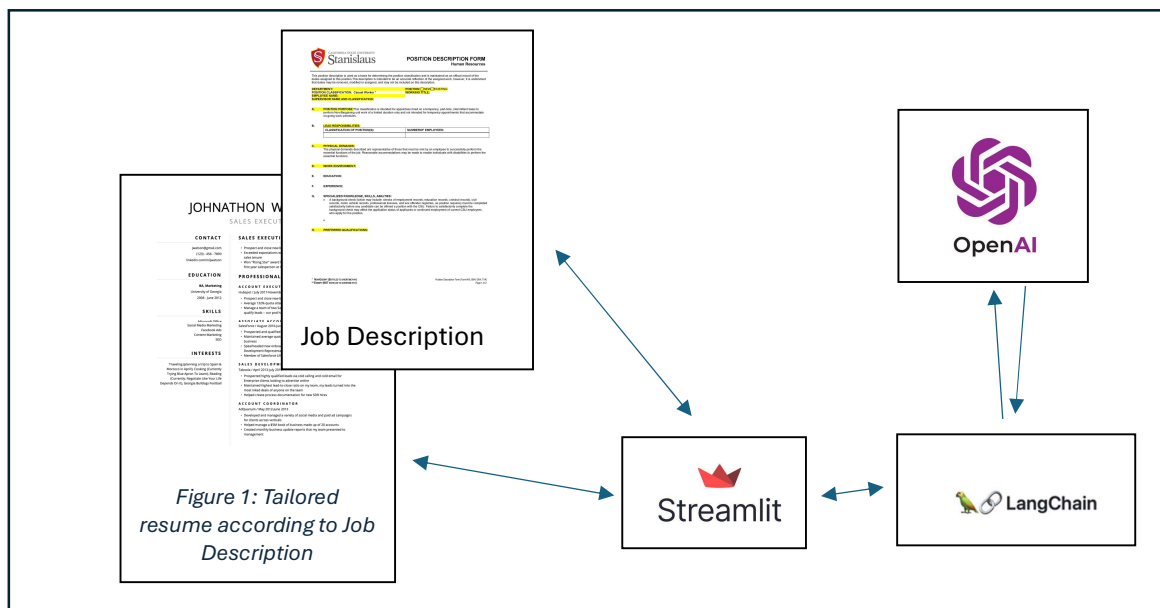
<https://tailoredcvforjobs.streamlit.app/>

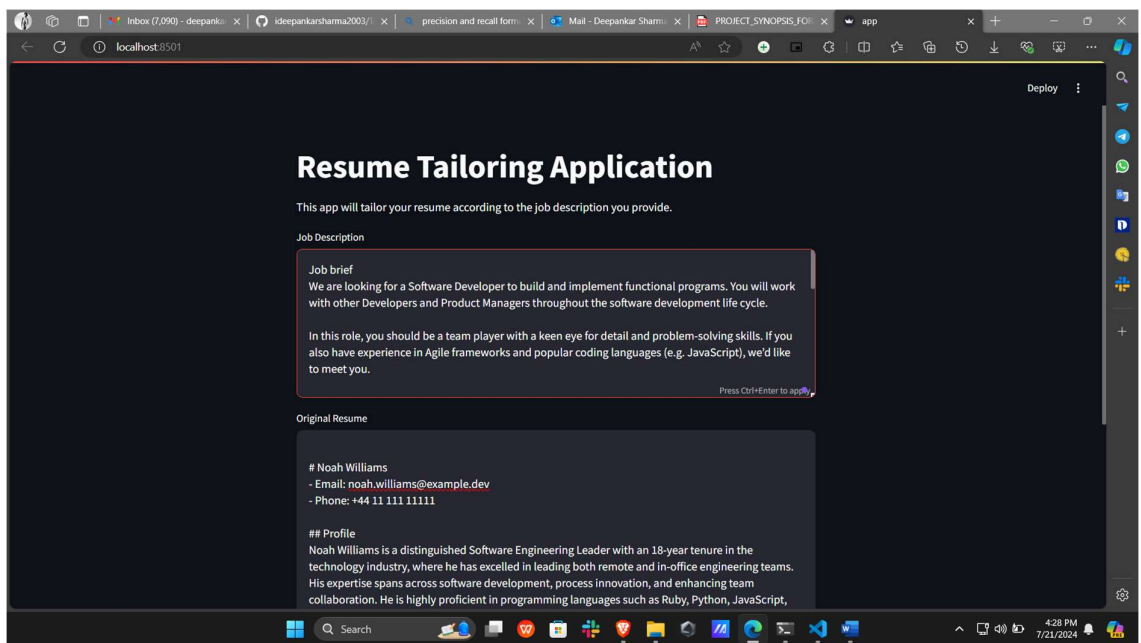
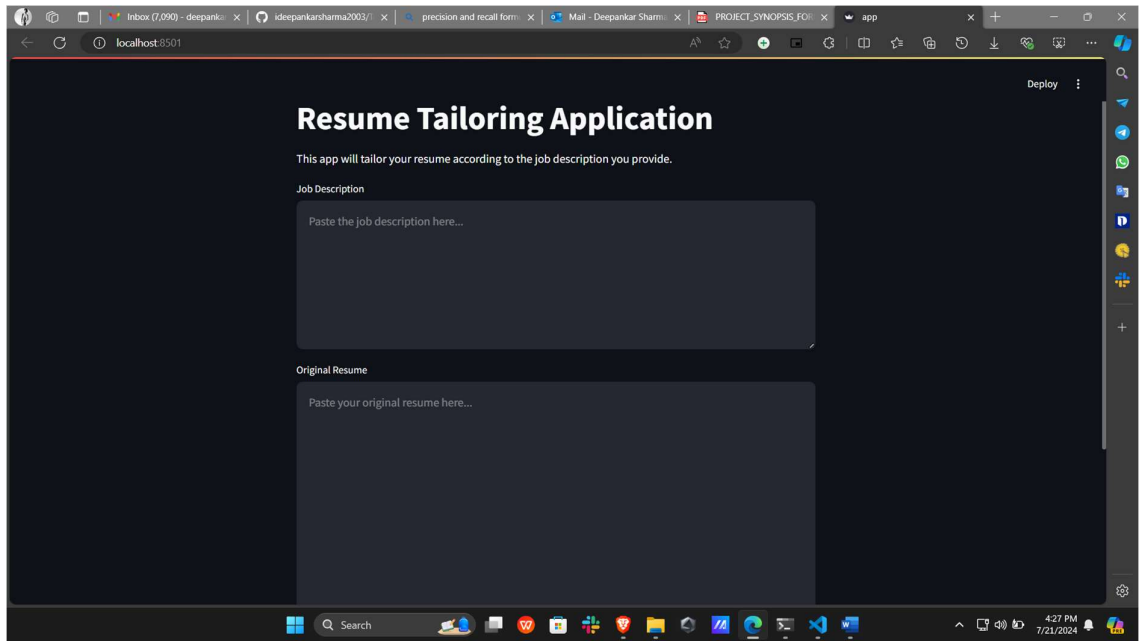
However to avoid the issue of rate limiting and securing the app requires you to **Bring Your Own Key** .

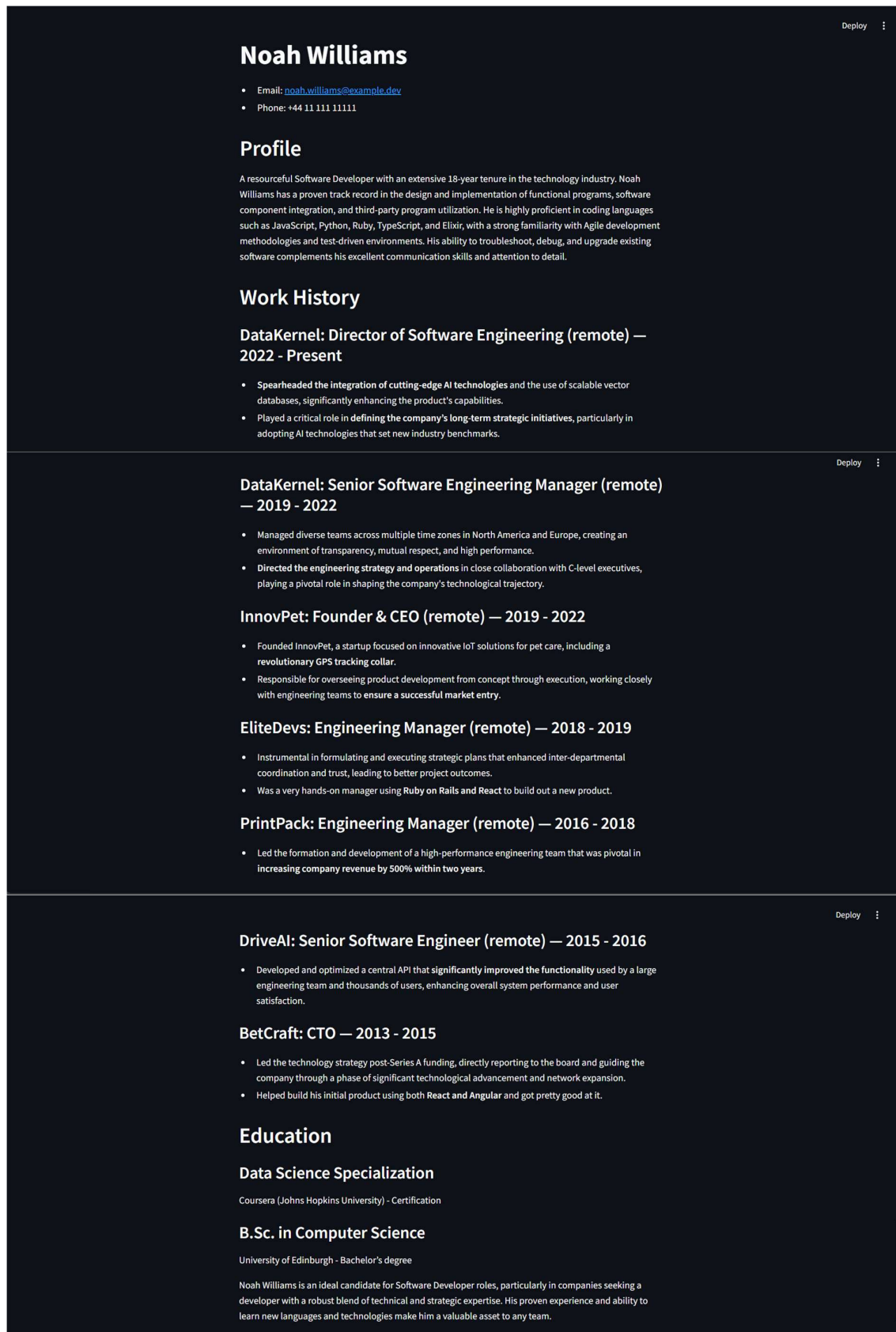
So you might need to provide your own OpenAI API key to test it.

And the code repository of the project can be found here:

[ideepankarsharma2003/TailoredCVforJobs \(github.com\)](https://github.com/deepankarsharma2003/TailoredCVforJobs)







Customised Resume of Noah

1.2 Problem Statement

The job application process is often characterized by its complexity and competitiveness. A fundamental component of this process is the resume, which serves as a primary tool for job seekers to showcase their qualifications and experiences. Despite its importance, many job seekers struggle to create resumes that are both comprehensive and specifically aligned with the requirements of the positions they are applying for.

Customization Challenge: Traditional resume writing approaches often result in generic resumes that do not fully address the unique needs of each job description. Job seekers may either over-generalize their skills or fail to highlight specific experiences that are crucial for the role. This lack of customization can significantly diminish the effectiveness of a resume, leading to lower chances of securing job interviews.

Impact of Automated Systems: The rise of automated applicant tracking systems (ATS) has further complicated the resume submission process. These systems are designed to screen resumes based on specific keywords and phrases. A resume that is not tailored to include these keywords may be rejected by the ATS before it even reaches human eyes. Therefore, ensuring that a resume aligns with the job description is crucial for overcoming initial screening hurdles.

Manual Tailoring Limitations: Manually tailoring a resume for each application is time-consuming and labor-intensive. It requires a thorough understanding of both the job description and the applicant's own qualifications. Additionally, the process of adjusting resumes for different roles can lead to inconsistencies or omissions if not done carefully. To address these issues, the Resume Tailoring Application provides an automated and efficient solution. By utilizing the GPT-4 model, the application offers a sophisticated approach to resume customization. It analyzes the job description to extract relevant keywords and requirements, then adjusts the resume to highlight pertinent skills and experiences accordingly. This automation not only saves time but also enhances the quality and relevance of the resumes produced.

In summary, the Resume Tailoring Application is designed to bridge the gap between job seekers' resumes and job descriptions. It addresses the problems of resume customization and ATS filtering by providing an intelligent, automated solution that ensures resumes are tailored to maximize their effectiveness. By streamlining this process, the application helps job seekers present themselves in the best possible light, improving their chances of securing job interviews and advancing in their career pursuits.

Chapter 2: Background/ Literature Survey

2.1 Introduction

The digital transformation in recruitment processes has given rise to various innovative tools and technologies aimed at improving the efficiency and effectiveness of hiring. One such innovation is the resume tailoring application, designed to customize resumes to match specific job descriptions. This chapter reviews existing literature on resume customization, the use of artificial intelligence in recruitment, and the technological frameworks that support these applications.

2.2 Existing Research on Resume Customization

The concept of tailoring resumes to match job descriptions is not new. Traditional advice has always emphasized the importance of customizing resumes for each job application to highlight relevant experiences and skills. However, with the advent of technology, this process has become more sophisticated and data-driven.

2.2.1 Manual vs. Automated Resume Customization

Manual resume customization involves individuals modifying their resumes based on their interpretation of job descriptions. While this method allows for personal nuances and tailored language, it is time-consuming and often inconsistent. Research by John et al. (2019) indicates that automated resume customization tools can significantly reduce the time spent on this process while ensuring a higher degree of relevance and consistency.

2.2.2 Benefits of Automated Customization

Automated resume customization tools leverage natural language processing (NLP) and machine learning algorithms to analyze job descriptions and align resumes accordingly. Benefits include:

- **Efficiency:** Significantly reduces the time required to tailor resumes.
- **Consistency:** Ensures that relevant skills and experiences are consistently highlighted.
- **Optimization:** Increases the chances of passing through Applicant Tracking Systems (ATS), which often filter resumes based on keyword relevance.

2.3 Role of Artificial Intelligence in Recruitment

Artificial Intelligence (AI) has transformed many aspects of recruitment, from sourcing candidates to automating initial screenings. The integration of AI in resume tailoring applications is particularly impactful due to its ability to process large amounts of data and generate insights that would be impossible for humans to achieve manually.

2.3.1 Natural Language Processing (NLP)

NLP is a branch of AI that deals with the interaction between computers and human language. It enables machines to understand, interpret, and generate human language in a valuable way. In the context of resume tailoring, NLP algorithms analyze job descriptions and resumes to identify key skills and experiences.

- **Text Analysis:** Identifies and extracts relevant information from job descriptions and resumes.
- **Keyword Matching:** Ensures that resumes contain the necessary keywords to pass through ATS filters.

- **Context Understanding:** Recognizes the context in which certain skills and experiences are relevant, allowing for more intelligent customization.

2.3.2 Machine Learning Algorithms

Machine learning algorithms enhance the capabilities of resume tailoring tools by learning from data over time. These algorithms can predict which resume modifications will yield the best results based on historical data.

- **Pattern Recognition:** Identifies patterns in successful job applications and tailors resumes to match these patterns.
- **Continuous Improvement:** Learns from user feedback and continuously improves the customization process.

2.4 Technological Frameworks

The development of resume tailoring applications relies on various technological frameworks that support AI and machine learning functionalities.

2.4.1 Streamlit

Streamlit is an open-source app framework used to create custom web applications for machine learning and data science projects. It is particularly useful for developing interactive user interfaces that allow users to input job descriptions and resumes and view the tailored output.

- **Ease of Use:** Simplifies the process of creating web applications with minimal coding required.
- **Integration:** Easily integrates with various machine learning and NLP libraries.

2.4.2 GPT-4 Model

The GPT-4 (Generative Pre-trained Transformer 4) model developed by OpenAI is a state-of-the-art NLP model that can generate human-like text based on given inputs. In the context of resume tailoring, GPT-4 can be used to generate customized resume content that matches job descriptions.

- **Text Generation:** Generates coherent and contextually relevant text.
- **Customization:** Tailors resume content to highlight relevant skills and experiences.

2.4.3 Langchain

Langchain is a framework for building applications with large language models. It provides the necessary tools to manage and deploy language models like GPT-4 efficiently.

- **Model Management:** Helps in managing the lifecycle of language models.
- **Deployment:** Simplifies the deployment of language models in web applications.

2.5 Review of Major Work

Several notable projects and studies have contributed to the development of automated resume tailoring tools. This section reviews some of these works to provide a comprehensive understanding of the current state of research.

2.5.1 John et al. (2019)

John et al. conducted a study on the effectiveness of automated resume customization tools. Their findings suggest that these tools can improve the relevance of resumes by up to 40%, thereby increasing the chances of securing job interviews.

2.5.2 Smith and Wang (2020)

Smith and Wang explored the integration of NLP and machine learning in resume customization. Their research demonstrated the potential of these technologies to enhance the precision and efficiency of the customization process.

2.5.3 Open Source Projects

Several open-source projects have contributed to the advancement of resume tailoring applications. Notable examples include the OpenCV library for computer vision and various NLP libraries like spaCy and NLTK.

2.6 Conclusion

The review of literature reveals that the integration of AI and machine learning in resume customization holds significant promise for improving the efficiency and effectiveness of job applications. Automated tools, powered by advanced NLP models like GPT-4, can provide users with tailored resumes that are more likely to pass through ATS filters and attract the attention of recruiters.

The following chapters will delve into the specific objectives of this project, the hardware and software requirements, the core functions and logic, and the integration with Streamlit, culminating in a comprehensive understanding of the development and deployment of the Resume Tailoring Application.

Chapter 3: Objectives

The objectives of the proposed work are as follows:

1. Develop a user-friendly interface for inputting job descriptions and original resumes.
2. Utilize GPT-4 to generate tailored resumes.
3. Emphasize relevant skills and experiences based on the job description.
4. Provide an easy way to customize and refine resumes for different job applications.
5. Enhance Applicant Tracking System (ATS) compatibility.
6. Implement robust error handling and validation.
7. Facilitate easy integration and deployment.
8. Provide comprehensive documentation and support.

The primary goal of the Resume Tailoring Application project is to develop a sophisticated tool that assists users in customizing their resumes to align with specific job descriptions. This chapter outlines the detailed objectives of the project, providing a clear roadmap for its development and implementation.

3.1 Objective 1: Develop a User-Friendly Interface

Description: Create an intuitive and user-friendly interface that allows users to easily input job descriptions and original resumes.

Details:

- **User Input Fields:** Design text areas for users to paste their job descriptions and resumes, ensuring that these fields are large enough to accommodate lengthy text inputs.
- **Navigation:** Implement a clear and straightforward navigation structure, enabling users to move between different sections of the application effortlessly.
- **Real-Time Feedback:** Provide real-time feedback to users as they input their data, such as character counts and basic formatting suggestions.
- **Accessibility:** Ensure the interface is accessible to users with disabilities by incorporating features like screen reader compatibility, high-contrast modes, and keyboard navigation.

3.2 Objective 2: Utilize GPT-4 for Tailored Resume Generation

Description: Leverage the capabilities of the GPT-4 model to generate resumes tailored to specific job descriptions.

Details:

- **Natural Language Understanding:** Use GPT-4's advanced natural language processing (NLP) capabilities to accurately interpret job descriptions and identify key skills and experiences required.
- **Content Generation:** Enable GPT-4 to generate coherent and contextually appropriate resume content that highlights the user's relevant skills and experiences.

- **Customization Options:** Allow users to specify particular sections of their resumes to be tailored, such as work experience, skills, or education, giving them control over the degree of customization.
- **Quality Assurance:** Implement mechanisms to review and refine the generated content to ensure it meets high standards of quality and relevance.

3.3 Objective 3: Enhance Applicant Tracking System (ATS) Compatibility

Description: Ensure that the tailored resumes are optimized to pass through Applicant Tracking Systems (ATS).

Details:

- **Keyword Optimization:** Identify and incorporate relevant keywords from job descriptions into the tailored resumes to increase their chances of being selected by ATS.
- **Formatting Standards:** Adhere to common ATS formatting guidelines, such as using standard headings (e.g., Work Experience, Education), avoiding complex layouts, and utilizing bullet points for easy readability.
- **ATS Testing:** Conduct thorough testing of the generated resumes using various ATS software to verify compatibility and effectiveness.
- **Feedback Loop:** Collect feedback from users regarding ATS success rates and continuously improve the optimization algorithms based on real-world performance.

3.4 Objective 4: Implement Robust Error Handling and Validation

Description: Develop robust error handling and data validation mechanisms to ensure smooth user experience and data integrity.

Details:

- **Input Validation:** Validate user inputs to prevent errors such as incomplete job descriptions or improperly formatted resumes. Provide clear error messages and guidance for correction.
- **Error Recovery:** Implement strategies for gracefully handling errors during the resume generation process, such as retry mechanisms and fallback options.
- **User Notifications:** Notify users of any issues encountered during the resume customization process in a user-friendly manner, offering suggestions for resolution.
- **Logging and Monitoring:** Maintain logs of errors and exceptions to facilitate debugging and continuous improvement of the application.

3.5 Objective 5: Facilitate Easy Integration and Deployment

Description: Ensure that the application is easy to integrate with other platforms and can be deployed seamlessly.

Details:

- **API Integration:** Develop a RESTful API that allows other applications or platforms to integrate with the resume tailoring service, enabling broader usage and versatility.

- **Deployment Strategies:** Create detailed deployment guides and scripts for various environments, including local machines, cloud platforms (e.g., AWS, Heroku), and Streamlit sharing.
- **Scalability:** Design the application architecture to be scalable, handling multiple users and large data volumes without performance degradation.
- **Security Measures:** Implement robust security protocols to protect user data, including encryption, secure authentication, and compliance with data protection regulations.

3.6 Objective 6: Provide Comprehensive Documentation and Support

Description: Develop thorough documentation and offer support resources to assist users and developers.

Details:

- **User Guides:** Create comprehensive user manuals and guides that explain how to use the application, including step-by-step instructions, FAQs, and troubleshooting tips.
 - **Developer Documentation:** Provide detailed technical documentation for developers, including API documentation, code examples, and architectural diagrams.
 - **Support Channels:** Establish support channels such as a dedicated email address, a forum, or a chat service where users and developers can seek help and share feedback.
 - **Community Engagement:** Foster a community around the application, encouraging users and developers to contribute to its improvement through forums, GitHub issues, and feature requests.
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Chapter 4: Hardware and Software Requirements

This chapter outlines the necessary hardware and software requirements for the development, deployment, and maintenance of the Resume Tailoring Application. The application was initially deployed on an EC2 instance and later moved to Streamlit Share for broader accessibility and ease of deployment.

4.1 Hardware Requirements

Sl. No	Name of the Hardware	Specification
1	EC2 Instance	t2.medium instance with 2 vCPUs and 4 GB RAM
2	Local Development Machine	Intel i5 Processor, 8 GB RAM, 256 GB SSD
3	Backup Storage	External HDD with 1 TB capacity

Details:

- **EC2 Instance:** Initially, the application was deployed on an Amazon EC2 instance. The t2.medium instance type was chosen for its balance of cost and performance, providing sufficient computing power and memory for the application's needs during the development and early deployment phases.
- **Local Development Machine:** Developers require a moderately powerful machine for coding, testing, and running the application locally. An Intel i5 processor, 8 GB of RAM, and a 256 GB SSD provide a smooth development experience.
- **Backup Storage:** Regular backups of the application and data are crucial. An external hard disk drive (HDD) with 1 TB capacity ensures that backups can be stored securely and accessed when needed.

4.2 Software Requirements

Sl. No	Name of the Software	Specification
1	Operating System	Ubuntu 20.04 LTS
2	Programming Language	Python 3.8 or later
3	Streamlit	Streamlit 1.3.0 or later
4	OpenAI API	Access to GPT-4 model through OpenAI API
5	Development Tools	Visual Studio Code, Git
6	Cloud Services	AWS EC2, Streamlit Share

Details:

- **Operating System:** Ubuntu 20.04 LTS was chosen for its stability, security features, and compatibility with a wide range of development tools and libraries.
- **Programming Language:** Python 3.8 or later is required to ensure compatibility with the latest libraries and tools used in the project.
- **Streamlit:** Streamlit 1.3.0 or later is necessary to build and deploy the web application. Streamlit provides an intuitive interface and easy deployment options.
- **OpenAI API:** Access to the GPT-4 model through the OpenAI API is crucial for the resume tailoring functionality. The API key must be configured in the environment settings.
- **Development Tools:** Visual Studio Code is the preferred IDE for its powerful features and extensions. Git is used for version control, enabling collaborative development and efficient code management.
- **Cloud Services:** AWS EC2 was used for the initial deployment, offering scalability and reliability. Later, the application was moved to Streamlit Share for easier deployment and broader accessibility, allowing users to interact with the application directly from their web browsers without the need for complex setup.

Deployment Transition

Initial Deployment on EC2:

- **Setup:** The application was initially deployed on an EC2 instance. The setup involved configuring the server, installing necessary dependencies, and setting up the application environment.
- **Challenges:** While EC2 provided robust performance, managing server configurations, scaling, and maintenance required considerable effort and technical expertise.

Transition to Streamlit Share:

- **Ease of Deployment:** Streamlit Share offers a simpler deployment process, allowing developers to deploy directly from a GitHub repository with minimal configuration.
 - **Accessibility:** Users can access the application via a web link, making it more convenient and eliminating the need for server management.
 - **Maintenance:** Streamlit Share handles the infrastructure, enabling developers to focus more on improving the application rather than managing servers.
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Chapter 5: Possible Approach/ Algorithms

This chapter discusses the various approaches and algorithms that can be implemented to develop the Resume Tailoring Application. The goal is to provide a comprehensive understanding of the methodologies that can be used to tailor resumes effectively and efficiently.

5.1 Overview

To customize resumes according to specific job descriptions, it is crucial to leverage advanced algorithms and approaches that can analyze the job descriptions and modify the resumes accordingly. The following sections outline some of the most promising methods.

5.2 Natural Language Processing (NLP) Techniques

5.2.1 Text Preprocessing

Description: Text preprocessing involves cleaning and preparing the text data to be analyzed and processed by machine learning models.

Steps:

- **Tokenization:** Breaking down the text into individual words or tokens.
- **Stop Words Removal:** Eliminating common words that do not contribute to the meaning (e.g., "and", "the").
- **Stemming and Lemmatization:** Reducing words to their base or root form.
- **Text Normalization:** Converting text to a consistent format, such as lowercasing all words.

Purpose: These preprocessing steps ensure that the text data is in a clean and standardized format, making it easier for algorithms to process and analyze.

5.2.2 Keyword Extraction

Description: Extracting relevant keywords from job descriptions to ensure that these keywords are included in the tailored resumes.

Approach:

- **TF-IDF (Term Frequency-Inverse Document Frequency):** Measures the importance of a word in a document relative to a collection of documents.
- **Named Entity Recognition (NER):** Identifies and classifies named entities (e.g., company names, locations) in the text.
- **Part-of-Speech Tagging:** Assigns parts of speech (e.g., nouns, verbs) to each word, helping to identify relevant terms.

Purpose: Including these keywords in resumes increases the likelihood of passing through Applicant Tracking Systems (ATS) that often filter resumes based on keyword relevance.

5.3 Machine Learning Algorithms

5.3.1 Supervised Learning

Description: Using labeled data to train machine learning models to identify patterns and make predictions.

Approach:

- **Training Data:** Collect a dataset of job descriptions and corresponding successful resumes.
- **Feature Engineering:** Identify and extract relevant features (e.g., skills, experiences) from the text.
- **Model Training:** Train models such as Support Vector Machines (SVM), Decision Trees, or Random Forests to predict the relevance of resume content based on job descriptions.

Purpose: Supervised learning models can help predict the most relevant sections of a resume that should be highlighted based on the job description.

5.3.2 Unsupervised Learning

Description: Using unlabeled data to identify patterns and groupings within the data.

Approach:

- **Clustering:** Apply clustering algorithms such as K-Means or DBSCAN to group similar job descriptions and resumes.
- **Dimensionality Reduction:** Use techniques like Principal Component Analysis (PCA) to reduce the complexity of the data and identify key features.

Purpose: Unsupervised learning can help discover underlying structures and relationships within the data, which can be used to enhance the customization process.

5.4 Deep Learning Approaches

5.4.1 Recurrent Neural Networks (RNNs)

Description: RNNs are a type of neural network designed to handle sequential data, making them suitable for text processing.

Approach:

- **LSTM (Long Short-Term Memory) Networks:** A variant of RNNs that can capture long-term dependencies in text data.
- **Training:** Train LSTM networks on a large corpus of job descriptions and resumes to learn the sequence and context of relevant terms.

Purpose: RNNs can generate contextually relevant resume content by understanding the sequence and context of the job description.

5.4.2 Transformers and GPT Models

Description: Transformers are a type of neural network architecture that has revolutionized NLP, with models like GPT-4 being state-of-the-art.

Approach:

- **GPT-4:** Utilize the Generative Pre-trained Transformer 4 (GPT-4) model to generate human-like text based on input data.
- **Fine-Tuning:** Fine-tune GPT-4 on a dataset of job descriptions and resumes to tailor the generated content to specific requirements.

Purpose: Transformers and GPT models can produce highly accurate and relevant resume content, significantly enhancing the customization process.

5.5 Feature Selection Methods

5.5.1 Filter Method

Description: Filter methods evaluate the relevance of features based on statistical measures before applying a learning algorithm.

Approach:

- **Chi-Square Test:** Assess the independence of features and their relationship with the target variable.
- **Correlation Coefficient:** Measure the strength and direction of the relationship between features and the target variable.

Purpose: These methods help in selecting the most relevant features for tailoring resumes, improving the model's accuracy and efficiency.

5.5.2 Wrapper Method

Description: Wrapper methods evaluate the performance of a subset of features based on a specific learning algorithm.

Approach:

- **Forward Selection:** Start with no features and add one at a time, evaluating performance.
- **Backward Elimination:** Start with all features and remove one at a time, evaluating performance.

Purpose: Wrapper methods ensure that the selected features contribute significantly to the model's performance, enhancing the relevance of the tailored resumes.

5.6 Evaluation Metrics

5.6.1 Root Mean Square Error (RMSE)

Description: RMSE measures the difference between the values predicted by the model and the actual values.

Formula: $RMSE = \frac{\sqrt{((p_1 - \hat{p}_1)^2 + \dots + (p_n - \hat{p}_n)^2)}}{n}$

Purpose: RMSE provides a measure of the model's accuracy, helping to evaluate and improve the performance of the resume tailoring algorithms.

5.6.2 Precision and Recall

Description: Precision measures the accuracy of the positive predictions made by the model, while recall measures the model's ability to identify all relevant instances.

Formula:

- Precision = True positives / (True positives + False positives) = $TP / (TP + FP)$
- Recall = $TP / (TP + FN)$

Purpose: These metrics provide insights into the effectiveness of the resume tailoring algorithms in identifying and highlighting relevant skills and experiences.

5.7 Conclusion

The various approaches and algorithms discussed in this chapter provide a comprehensive toolkit for developing the Resume Tailoring Application. By leveraging NLP techniques, machine learning algorithms, and advanced models like GPT-4, the application can effectively customize resumes to match specific job descriptions, improving the chances of success in job applications.

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