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"Smart Resume AI: An Intelligent System for Resume Creation and Evaluation."

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APPROVAL FORM

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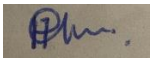
Student	Signature 	Date **17/06/2025**

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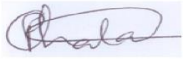
MR P CHAKA		**17/06/2025**
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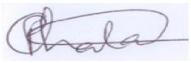		
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DEDICATION

this work is dedicated to all job seekers striving for their dreams. Your resilience and tenacity in the face of challenges inspire the development of tools designed to make the job application process more accessible and effective. Additionally, this dedication extends to those who support these individuals in their journey—mentors, family members, and friends—whose encouragement and belief in their potential make a significant difference.

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ABSTRACT

The Smart Resume AI project is designed to transform the job application process by offering a sophisticated, user-friendly platform that leverages artificial intelligence to assist job seekers in crafting and optimizing their resumes. As the job market becomes increasingly competitive, traditional resume-building methods often fall short in providing the guidance and adaptability necessary to meet the demands of modern hiring practices, particularly those involving Applicant Tracking Systems (ATS).

This application integrates a structured resume builder with an AI-powered analysis engine, enabling users to create professional-grade resumes while receiving actionable feedback tailored to specific job roles. Key features include an AI Resume Analyzer that evaluates uploaded documents based on keyword density, formatting integrity, and ATS compatibility, as well as a job role matching system that aligns user resumes with relevant job descriptions.

The application also offers a visual dashboard that displays real-time analytics, showcasing metrics such as ATS scores and usage patterns, thus empowering users with insights into their resume performance. Developed using the Streamlit framework, the platform emphasizes modularity and ease of use, requiring no advanced technical skills from users.

This report details the system's development process, its core functionalities, and the methodologies employed, highlighting its potential to enhance employability outcomes for job seekers. By providing a comprehensive tool that combines resume creation with intelligent analysis, Smart Resume AI aims to bridge the gap between job seekers and employers, ultimately contributing to a more efficient and effective hiring process.

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CHAPTER 1: INTRODUCTION

1.0 Introduction

In today's fast-moving digital world, job searching and hiring look very different than they did just a few years ago. Traditional ways of sending and screening resumes simply can't keep up with the high volume of applicants and increasing reliance on automated tools. This shift means we need smarter, more practical solutions — not only to help job seekers craft better resumes, but also to make life easier for recruiters.

That's where **Smart Resume AI** comes in. Built with Python and Streamlit, this web app is designed to help job seekers improve their resumes and help recruiters quickly review them. Using natural language processing (NLP) and data visualizations, Smart Resume AI guides candidates as they create strong resumes that align with job descriptions and pass applicant tracking systems (ATS). It also supports recruiters by offering features like bulk resume analysis and automated scoring, helping them make faster, fairer decisions. In short, it turns resume creation and evaluation into a smarter, more strategic process — saving time and cutting down the manual work.

1.1 Background to the Study

Hiring managers face a serious challenge today: too many applications and too little time. It's common for over 70% of resumes to never be seen by a human recruiter because they're filtered out by ATS software. Many candidates don't realize that formatting, keywords, and content structure can mean the difference between landing an interview or being overlooked entirely.

At the same time, HR teams often find themselves manually sifting through hundreds — even thousands — of resumes. This takes a lot of time, risks missing good candidates, and can introduce bias into the process. While big companies might use expensive enterprise tools to help, small and medium-sized businesses often can't afford those solutions.

That's why Smart Resume AI was created. It aims to help job seekers craft better resumes while also making the recruiter's job easier. By combining resume optimization tools with bulk analysis features and intelligent scoring, this platform fills a real gap in the job market.

1.2 Statement of the Problem

Two main problems stand out in today's job application process:

First, too many applicants submit resumes that are not well-optimized for ATS screening. Poor structure, missing keywords, and generic language mean that even qualified candidates often go unnoticed — and most people never even know what went wrong.

Second, recruiters and HR teams struggle to manage huge numbers of resumes. The traditional manual review process is slow, prone to mistakes, and often unfair. Existing tools tend to cater to either applicants or recruiters, but rarely address the needs of both.

That's why a dual-purpose, AI-powered solution like Smart Resume AI is so important — to improve the applicant's chances and help recruiters evaluate resumes more efficiently.

1.3 Aim and Objectives of the Study

Aim:
This project aims to design and build a smart web app that improves resume quality for job seekers and speeds up resume review for recruiters.

Objectives:

- Develop a friendly interface that guides applicants to build better resumes with templates and real-time tips.
- Implement AI features that check resumes for ATS compatibility and give helpful, actionable feedback.
- Create a bulk analysis feature so recruiters can quickly screen multiple resumes at once.
- Add a recommendation engine to suggest career skills or improvements tailored to each user.
- Offer a way to export polished resumes as .docx files.
- Provide recruiters and applicants with easy-to-understand data visualizations to help them make better decisions.

1.4 Purpose of the Study

The goal of this project is to make the hiring process smarter and more transparent. For job seekers, Smart Resume AI acts like a career coach — helping them improve their resumes with data-driven tips. For recruiters, it's like having a virtual assistant that can instantly score and sort applicants, reducing manual work and helping highlight the best candidates faster.

By putting both sides of the hiring process into one system, Smart Resume AI supports fairer and more efficient recruiting.

1.5 Scope of the Project

This project will deliver a web-based app using Python and Streamlit, focusing on resume optimization and recruiter tools. Key features include:

- An easy Resume Builder for applicants with templates and customization options.
- Resume Analysis tools that check structure, completeness, and ATS compatibility.
- Bulk Analysis for recruiters who need to review many resumes at once.
- A Recommendation Engine to help job seekers improve their skills or presentation.
- Dashboards that visualize resume scores, user activity, and job role trends.

Features like messaging, third-party job board integration, or automated job applications are outside the scope of this project. The focus is on making resumes better and making screening faster.

1.6 Definition of Terms

- **Applicant Tracking System (ATS):** Software that scans resumes and ranks them based on formatting and keywords.
- **Streamlit:** A Python library for building data-driven web apps quickly and easily.
- **Resume Analyzer:** A tool that reviews resumes for formatting, keyword use, structure, and overall quality.
- **Bulk Analysis:** Simultaneous evaluation of multiple resumes, often needed for large hiring drives.
- **Resume Builder:** Software that guides users to create structured, tailored resumes with templates.
- **AI Scoring:** Automated assessment of resume quality using natural language processing and machine learning.
- **Dashboard Analytics:** Visual tools like charts and graphs that highlight resume and hiring metrics so decisions can be more informed.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The growing use of digital tools in human resource management (HRM) has sparked a lot of interest in smarter systems that can improve how companies hire. One area that's seen big changes is resume optimization — something that's become essential now that Applicant Tracking Systems (ATS), AI-driven decisions, and data analytics are part of most hiring processes. These technologies have reshaped the way organizations recruit, making it crucial for both job seekers and employers to keep up.

As things keep evolving, the link between artificial intelligence (AI), natural language processing (NLP), and easy-to-use interface design has become more important than ever. This chapter reviews the academic and industry research behind Smart Resume AI. It looks at models, technologies, key features, and system design — and it highlights the gaps in traditional resume systems that Smart Resume AI aims to fill.

2.1 Development of the Smart Resume AI System

The Smart Resume AI system builds on several advances, from resume parsing and web app frameworks to machine learning. The idea came from seeing how most existing resume tools fall short — they don't give dynamic feedback, lack context, and don't really help recruiters dealing with tons of resumes.

To tackle these issues, Smart Resume AI brings together modern technologies that balance depth and ease of use:

- **Natural Language Processing (NLP)** — This helps the system read and understand resume content much like a person would. It spots important keywords and checks how well a resume matches a job description, so it can give meaningful feedback.
- **Streamlit Framework** — Chosen for its simplicity, Streamlit lets developers build interactive, user-friendly interfaces quickly — making it easier for job seekers to work with the system.
- **Plotly Library** — Plotly is used to create clear, interactive charts and graphs that help both applicants and recruiters make sense of data at a glance.
- **SQLite with SQLAlchemy ORM** — This forms the system's database, securely storing data so it can be retrieved whenever needed.
- **AI-Powered Resume Scoring** — The system uses trained AI models to evaluate resumes on things like formatting, ATS compatibility, keyword use, and skills. This helps users see exactly where and how they can improve.

The system is designed for two audiences: job seekers and recruiters. Job seekers get real-time feedback and personalized suggestions. Recruiters benefit from features like bulk resume uploads, analytics, and dashboards that make shortlisting candidates faster and easier.

2.2 Key Features of the Smart Resume AI System

Smart Resume AI is built with flexibility and future growth in mind. It combines resume-writing support with smart assessments and recommendations to create a powerful platform. Here are some of its main features:

- **Resume Builder Tool** — This guides users through creating resumes by prompting them to enter personal info, education, work experience, skills, and projects. It generates polished DOCX files with templates suited for different industries.
- **Standard Resume Analyzer** — This gives basic feedback on structure, completeness, and keyword relevance by comparing resumes to job categories.
- **AI-Based Resume Analyzer** — This goes deeper, providing section-by-section feedback, spotting missing keywords for the target job, and generating an ATS score.
- **Bulk Resume Analysis** — A time-saver for HR teams, this feature lets recruiters upload multiple resumes at once and get comparative results, speeding up shortlisting.
- **Skill and Course Recommendations** — Based on the resume and target job, the system suggests skills to build or courses to take, helping applicants strengthen their profiles.
- **Visual Dashboard and Analytics** — Admins can view real-time charts and graphs on resume scores, popular roles, skill trends, and user activity — all presented through Plotly dashboards for easy understanding.

Together, these features create a well-rounded tool that supports both job seekers and recruiters.

2.3 Why We Need a Smart Resume AI System

Most resume tools out there today are basic — they don't offer the flexibility, intelligence, or thorough feedback that people really need in today's job market. Hiring has changed, and there's a growing demand for smarter systems that can give tailored, practical advice to both applicants and employers.

Here's why Smart Resume AI is needed:

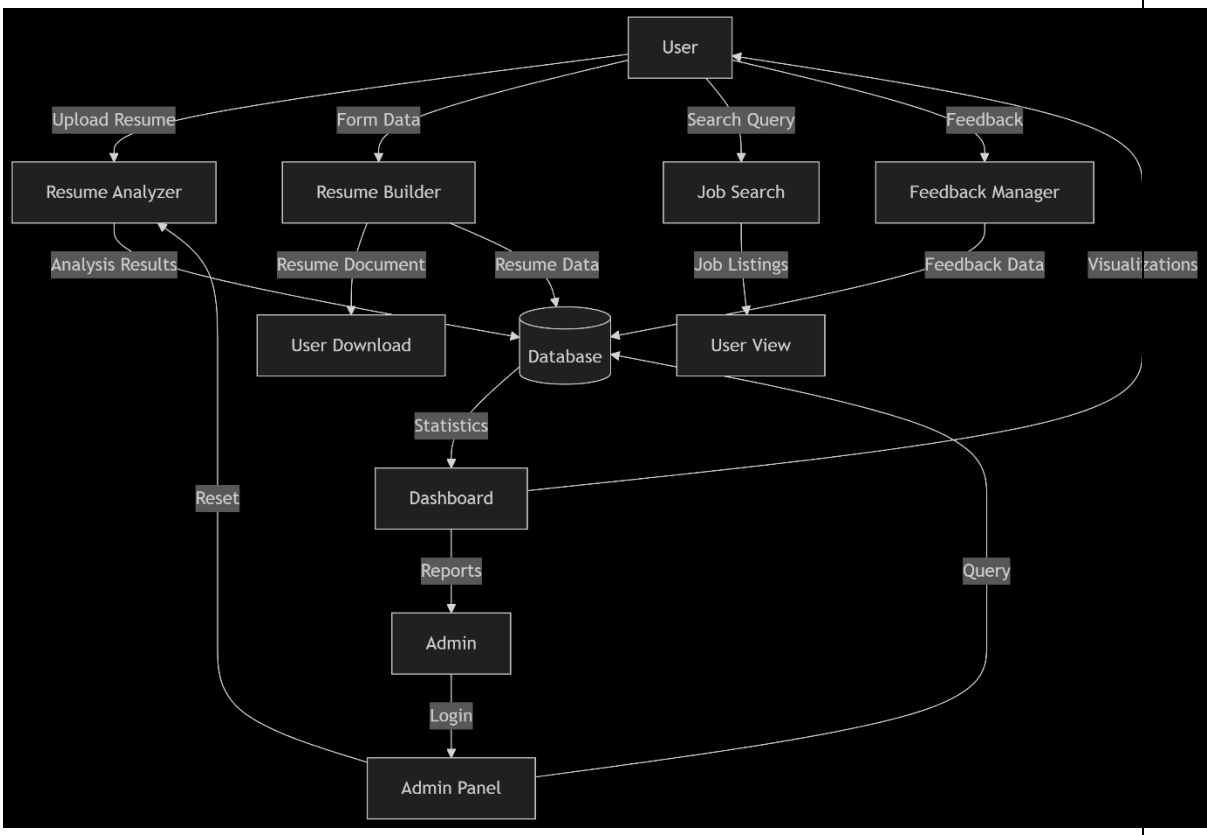
- **Custom Templates** — Job seekers want resumes that fit their industry or role. Standard templates often fall short.
- **Objective Scoring** — Scoring gives both applicants and recruiters a clearer way to judge how well a resume matches a job.
- **Targeted Feedback** — Generic tips don't help much. AI-powered suggestions give deeper, resume-specific advice.
- **Recruiter Support** — HR teams need help managing large volumes of applications. Bulk analysis ensures fair, fast screening.
- **Skill Matching** — By comparing resumes to job roles, the system helps candidates spot and fill skill gaps before they apply.

Smart Resume AI pulls all these needs together in one solution that makes resume creation and evaluation faster, smarter, and more useful for everyone involved.

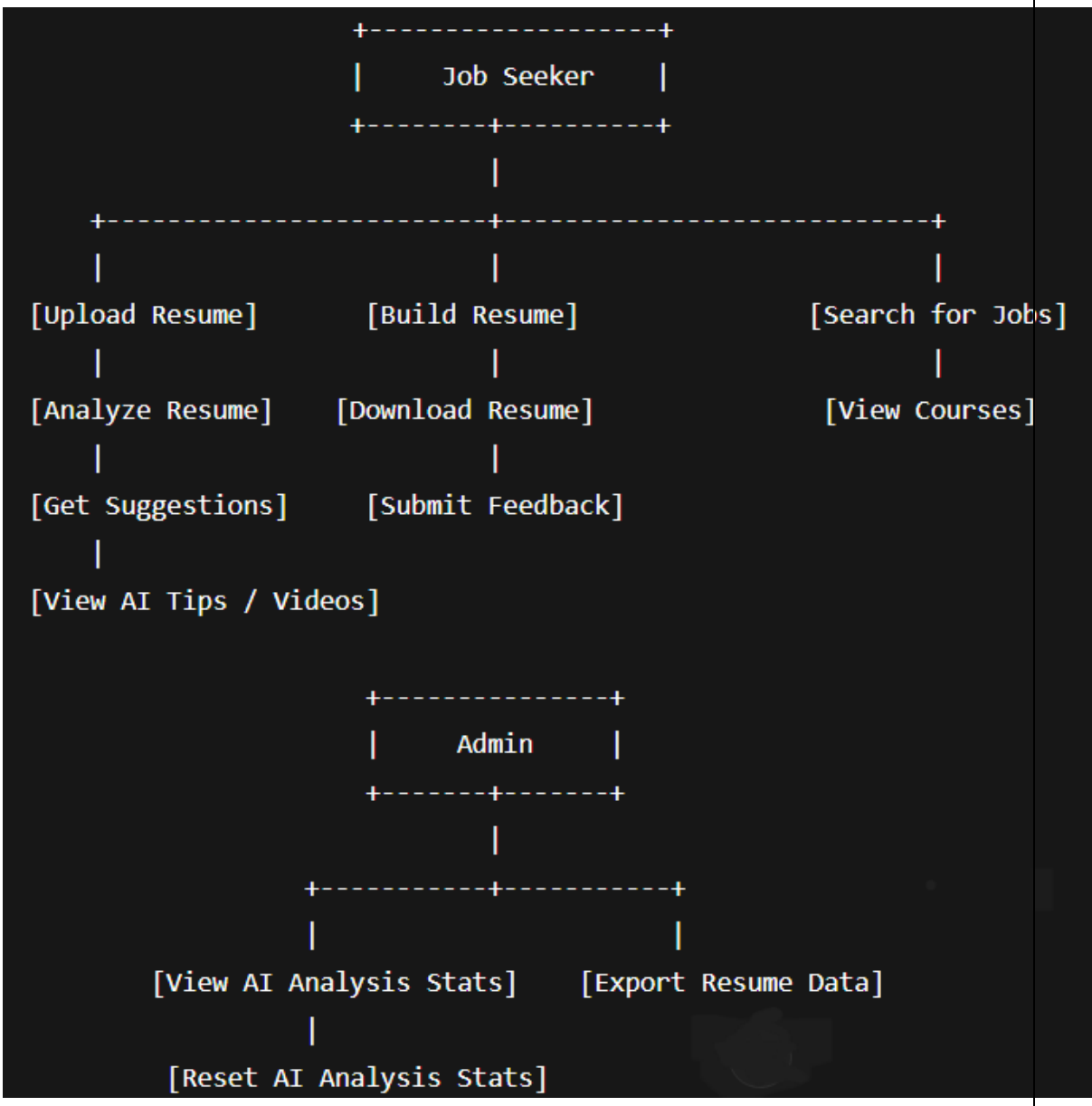
2.4 System Diagrams: ERD, UML, and Use Cases

The design of Smart Resume AI follows modular, object-oriented principles. The system is modeled using diagrams like Entity Relationship Diagrams (ERD), Use Case Diagrams, and Class Diagrams, which outline how it's structured and how users interact with it. You'll find these diagrams in the appendix, with summaries provided in this chapter.

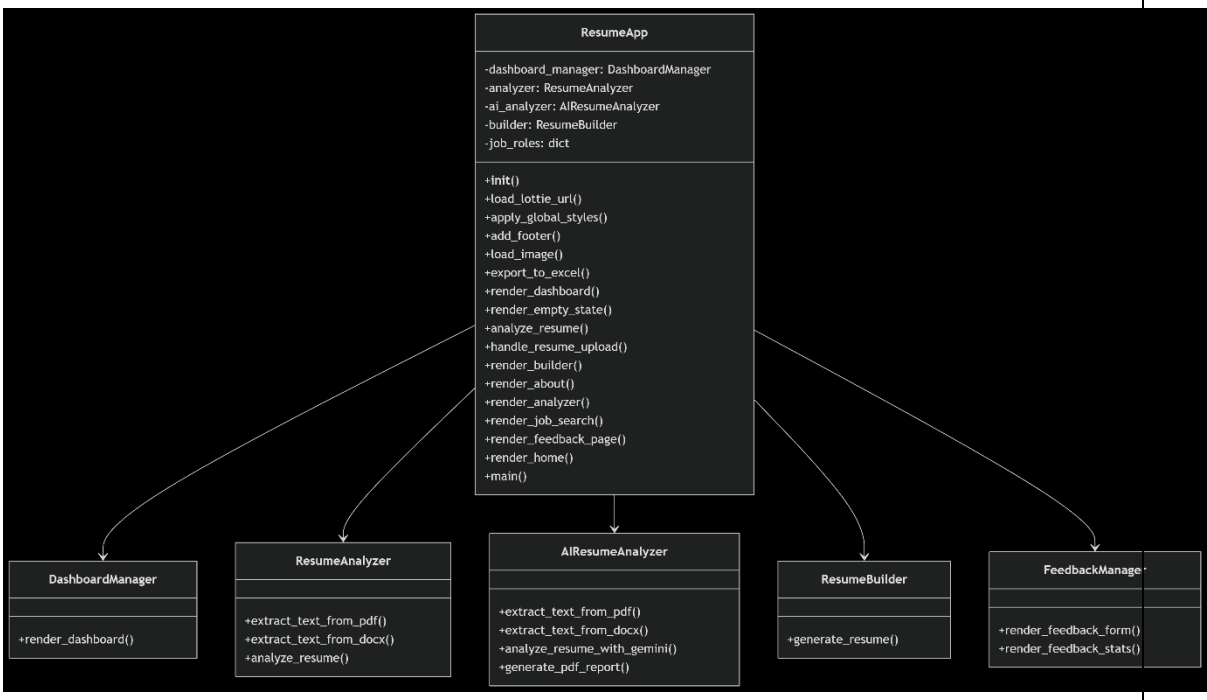
- **Entity Relationship Diagram (ERD):** This diagram outlines key entities, including:
    - **User:** Stores attributes like user ID, name, email, and role (applicant or recruiter).
    - **Resume:** Captures metadata associated with the resume, including user ID, summary, and creation timestamp.
    - **Analysis:** Contains scoring metrics such as ATS compatibility, keyword match ratio, and formatting evaluation.
    - **Supporting Tables:** Includes project details, experience entries, educational background, and categorized skills—each linked to the Resume entity.



- **Use Case Diagram:** This diagram illustrates the interactions between actors and system functions, including:
    - **Actors:** Applicant and Admin/Recruiter.
    - **Use Cases:** Build Resume, Upload Resume, Analyze Resume (both Standard and AI), View Suggestions, Upload Bulk Resumes, Export Results, and Access Dashboard.



- **Class Diagram:** This diagram defines the system components and their responsibilities, including:
    - **ResumeApp:** Core logic manager that orchestrates the overall functionality.
    - **ResumeAnalyzer:** Handles keyword and format analysis to evaluate resumes.
    - **AIResumeAnalyzer:** Implements machine learning models for scoring resumes based on various criteria.
    - **DashboardManager:** Manages data visualization and analytics features.
    - **ResumeBuilder:** Interfaces with users for document creation and management.



These diagrams serve as blueprints that guided the implementation phase and ensure alignment with software engineering best practices, providing clarity and structure to the development process.

2.5 Review of Limitations in Existing Resume Systems

Although there are plenty of resume-building tools available today, most of them still leave a lot to be desired. Many tools don't fully meet the practical needs of job seekers or recruiters, especially when it comes to modern hiring processes. Some common shortcomings include:

- **Limited interactivity:** A lot of these platforms just produce static resumes without giving users real-time guidance or personalized feedback. This can make it difficult for people to improve their resumes as they go.
- **Lack of AI-driven insight:** Very few systems leverage advanced technologies like machine learning or natural language processing. Without these capabilities, most tools can only offer generic advice that doesn't really help job seekers stand out.
- **Not recruiter-friendly:** Existing tools tend to focus almost entirely on applicants and rarely address the challenges recruiters face — like sifting through huge volumes of resumes quickly and fairly.
- **Generic, one-size-fits-all suggestions:** The feedback most tools offer is rarely tailored to the job role or industry. Applicants need targeted, role-specific advice to truly enhance their resumes.
- **Accessibility barriers:** Some resume platforms require expensive subscriptions, use clunky interfaces, or lack mobile-friendly designs — making them difficult for people with limited budgets or technical skills to use.
- **No bulk-processing capabilities:** Traditional resume tools don't support uploading and analyzing multiple resumes at once, forcing recruiters to spend extra time reviewing candidates individually.

Smart Resume AI was designed with these real-world limitations in mind. By combining advanced AI with an easy-to-use interface, it supports both job seekers and recruiters. Its personalized guidance, real-time scoring, tailored skill suggestions, and bulk-processing features make it a practical, all-in-one solution for today's fast-moving hiring landscape.

CHAPTER 3: SYSTEM ANALYSIS AND DESIGN

3.0 Introduction

This chapter walks through the analysis and design approach used to build the Smart Resume AI web app. With digital recruitment and AI solutions evolving rapidly, there's a growing need to fix the gaps in traditional resume tools — especially their lack of interactivity, intelligence, and useful feedback. Here, we identify key problems with existing systems and present Smart Resume AI as a modern, user-friendly solution designed to solve them. We'll look at how the system was planned, the technology choices, and how it's built to be scalable, adaptable, and easy to use.

3.1 Information Gathering

To make sure the system met real user needs, we kicked off development with a thorough information-gathering phase, using different methods:

- **Stakeholder Interviews:** We spoke with job seekers, HR managers, career coaches, and IT experts. These conversations helped us uncover pain points like rigid

templates, generic feedback, and a lack of tools for recruiters dealing with high volumes of resumes.

- **User Surveys:** We ran surveys across online platforms and schools to gather data on what users wanted. The feedback showed frustration with current resume tools — especially around accuracy, ease of use, and relevance to specific job roles.
- **Market & Competitor Analysis:** We looked closely at popular platforms like Canva, Zety, and Resume.io to spot gaps and opportunities. This helped us figure out what would make Smart Resume AI stand out.
- **Beta Testing:** During prototype testing, we paid close attention to how users interacted with the system. Feedback highlighted the need for easier navigation, more flexible templates, and better analytics — all of which shaped the final design.

3.2 Analysis of Existing Systems

3.2.1 Limitations of Existing Resume Platforms

Many existing resume tools have several weaknesses that affect both users and recruiters:

- **Shallow analysis:** Most focus on simple keyword scanning and ignore deeper elements like writing quality or how well a resume aligns with a career path.
- **Outdated interfaces:** Many platforms aren't mobile-friendly or interactive, making them clunky to use.
- **Poor integration:** It's often hard for users to connect these tools to ATS systems, LinkedIn, or job boards, meaning more manual work.
- **Generic suggestions:** Feedback is usually one-size-fits-all and doesn't consider the user's experience, goals, or industry.
- **No real-world feedback:** Users rarely get insights into how their resumes actually perform in job applications, so they can't improve effectively.

3.2.2 The Smart Resume AI Solution

Smart Resume AI was designed to overcome these issues using advanced technology and a strong focus on user experience. Key features include:

- **User-friendly design:** A clean, modern interface that works well across devices and is easy for anyone to use.
- **AI-powered resume analysis:** Machine learning and NLP provide detailed, section-by-section feedback, helping users fine-tune resumes for specific roles.
- **Central dashboard:** Both job seekers and recruiters can track resume stats, monitor progress, and get personalized skill suggestions.
- **Easy integration:** The platform works smoothly with ATS systems, LinkedIn, and other platforms, helping users streamline their job search.
- **Tailored recommendations:** The system suggests specific skills, courses, or improvements based on the user's resume and career goals.

3.2.3 Advantages of Smart Resume AI

Our platform offers clear benefits over traditional resume tools:

- **Smart feedback:** Get personalized advice on grammar, layout, keywords, and formatting — helping resumes pass both ATS filters and human review.
- **Easy to use:** The platform is designed for everyone, no matter their tech skills.
- **Real-time scoring:** Upload a resume and get instant feedback, so you can make changes before applying.
- **Performance tracking:** See how your resume performs and where your skill gaps are, supporting continuous improvement.
- **Time-saving tools for recruiters:** Bulk analysis lets recruiters review multiple resumes at once and shortlist candidates faster.

3.3 Design and Implementation Approach

3.3.1 Software Requirements

The system uses a mix of modern tools and libraries:

- **Frontend:** Streamlit powers the interface, making it interactive and quick to build.
- **Backend:** Flask or Django handles the app's logic, routing, and AI service connections.
- **Database:** PostgreSQL or SQLite stores user data and analysis logs securely.
- **NLP libraries:** Tools like spaCy, NLTK, and TextBlob help with tasks like keyword extraction and sentence analysis.
- **Machine learning:** TensorFlow and PyTorch support resume scoring, recommendations, and classification features.

3.3.2 Hardware Requirements

- **Cloud hosting:** The app runs on scalable services like AWS or Azure, allowing it to grow as user demand increases.
- **Compute resources:** GPUs help power fast, accurate AI analysis.
- **Storage:** Cloud storage keeps resumes, profiles, and results safe and easy to access.
- **Security:** Backups, firewalls, and recovery plans protect user data.

3.4 Development Methodology

3.4.1 Agile Workflow

We followed Agile practices — working in short sprints, testing continuously, and involving stakeholders at every stage. This kept development flexible and user-focused.

3.4.2 Requirements & Design

- We gathered detailed requirements through interviews and workshops.
- We created user stories and personas to keep user needs front and center.
- Use case diagrams showed how users would interact with the system.
- Wireframes and prototypes gave early design feedback before full development.
- ER diagrams mapped how data like resumes, feedback, and job roles connect.
- The app uses a layered architecture: Streamlit (UI), Flask (logic), PostgreSQL (storage), TensorFlow (AI).

3.4.3 Architecture Highlights

- **Presentation layer:** Streamlit delivers the user interface.
- **Logic layer:** Handles input checks, AI feedback, and processes data.
- **Data layer:** Manages database connections and external API calls.

3.4.4 Strengths of the Design

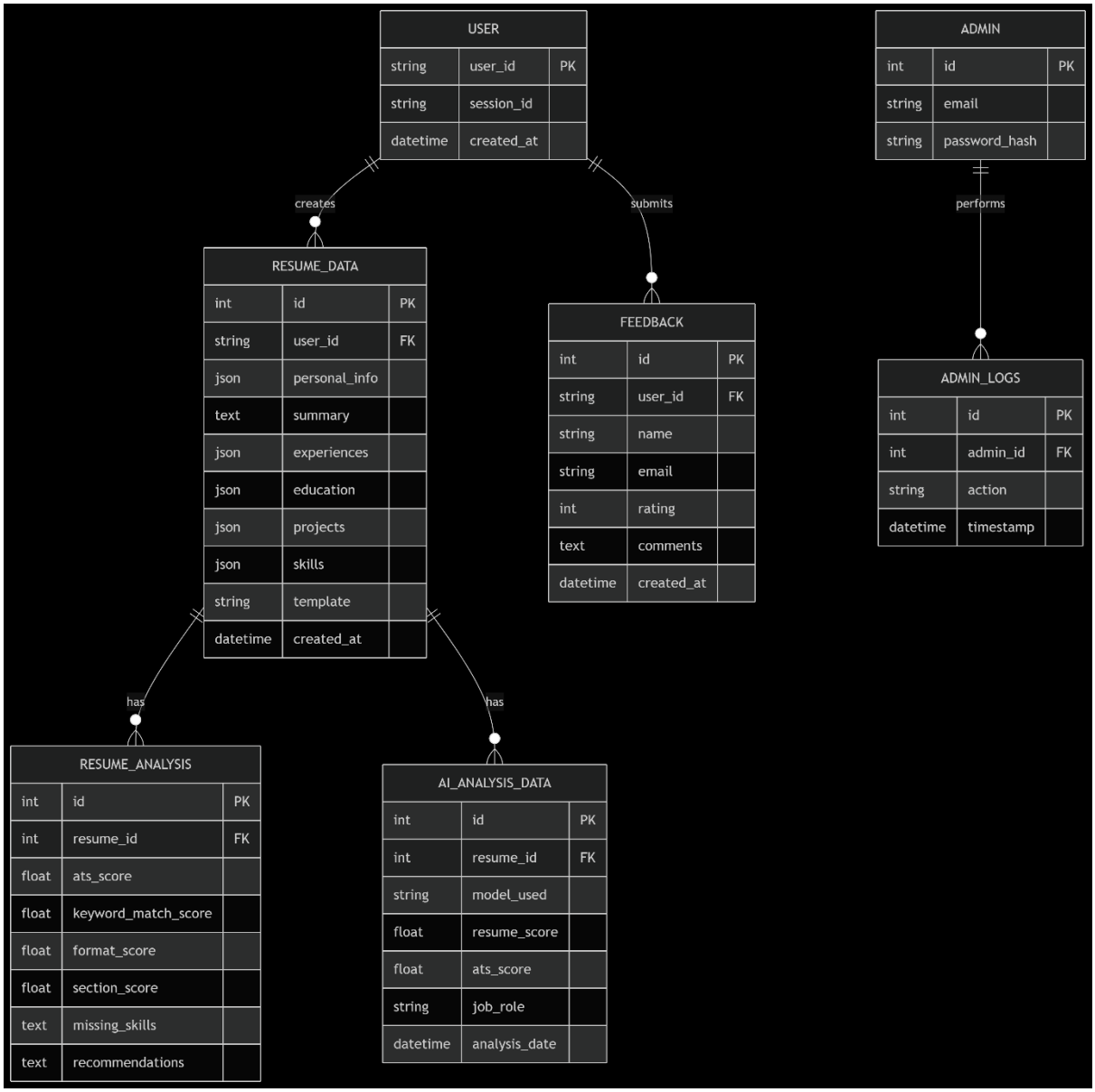
- Easy to scale as the user base grows.
- Simple to maintain and update.
- Reusable components save time on future projects.

3.4.5 Challenges of the Design

- More components mean more complexity when testing or coordinating development.
- Communication between layers can introduce minor delays if not optimized.

3.5 Dataflow Diagrams

Dataflow diagrams (DFDs) help visualize how information moves through the app — from users uploading resumes to getting feedback and reports. These diagrams will help spot bottlenecks and make sure data flows smoothly, creating a better experience for everyone.



3.6 Testing

A comprehensive testing strategy will be implemented to ensure the quality, reliability, and performance of the Smart Resume AI application. This strategy will encompass several testing methodologies:

- **Unit Testing:** Each individual component of the system will be thoroughly tested to ensure that it functions as expected, verifying that all features meet defined specifications.

- **Integration Testing:** This phase will ensure that integrated components work correctly together as a cohesive system, identifying any issues that may arise from interactions between different modules.
- **User Acceptance Testing (UAT):** Feedback will be gathered from real users to validate that the system meets their needs and expectations. UAT is crucial for ensuring that the application is user-friendly and effectively addresses the challenges faced by job seekers and recruiters alike.

CHAPTER 4: SYSTEM IMPLEMENTATION AND CONTROL

4.0 Introduction

In this chapter, we take a closer look at how the Smart Resume AI web app was actually built. We'll cover the development approach, the system architecture, and the tools and technologies involved. Using Python and the Streamlit framework, this application was designed to make resume building and analysis smarter and easier for both job seekers and administrators. You'll find details here on everything from the software and hardware requirements to how the system is structured, how the user interface looks, and how data is managed behind the scenes.

4.1 Implementation of the System

Smart Resume AI was developed with a modular design using Python and Streamlit. Streamlit was chosen because it's simple to use, highly responsive, and plays well with powerful Python machine learning libraries — all while providing a smooth and friendly user experience.

How the System is Organized

The application's code is broken down into clear parts to keep things neat, reusable, and easier to maintain. Here's a quick rundown:

- **app.py:** This is the heart of the app — it controls navigation, handles user sessions, and decides which parts of the app to show depending on what the user needs.
- **utils/**: A collection of helper modules that handle the heavy lifting like parsing resumes, running natural language processing tasks, matching keywords, and applying AI scoring algorithms.
- **config/**: This folder stores important settings, such as job roles and links between job types and suggested courses — making the app flexible and easy to update.
- **ui_components.py:** Contains reusable visual elements like banners, cards, headers, and footers, to keep the app looking consistent and polished.
- **dashboard.py & feedback.py:** These manage the admin dashboard and the user feedback system, helping both job seekers and recruiters get the insights they need.

How It Works (Workflow)

Here's the typical journey for a user on the platform:

1. **Starting up:** When the app launches, it sets up session info like which page the user is on, whether they're an admin, and stores analytics data.
2. **Loading the UI:** Custom fonts, styles, and animations are loaded to make the interface look inviting and easy to interact with.
3. **Navigation:** The app shows different pages based on where the user is — for example, home, resume builder, analyzer, dashboard, or feedback.
4. **Getting user input:** Users upload their resumes (PDF or DOCX) or fill out forms with their personal, education, and work details.
5. **Processing data:** The system analyzes uploaded data using AI tools — extracting keywords, checking formatting, scoring for ATS compatibility, and matching job roles.

6. **Saving data:** All submissions and analysis results are securely saved in an SQLite database for future reference.
7. **Showing feedback:** Users see detailed, interactive dashboards with resume scores, improvement tips, course recommendations, and formatting advice.
8. **Resume download:** Users can download their polished resumes in Word format (.docx) to easily share with employers.

4.2 Hardware Support

Smart Resume AI doesn't require heavy-duty hardware to run. It's built to be lightweight and efficient so that both developers and everyday users can work with it smoothly on typical computers — no need for expensive or powerful setups.

Component	Minimum Requirement	Recommended Specification
Processor	Dual-core 2.0 GHz	Quad-core 3.0 GHz or better
RAM	4 GB	8 GB or more
Storage	500 MB (installation only)	1 GB+ (for data retention)
Operating System	Windows 10, Linux, macOS	Any OS with Python 3.x support
Internet Access	Required for APIs/fonts	Stable broadband recommended

The system is deployable via cloud infrastructure such as Streamlit Cloud, Heroku, or AWS EC2, which ensures accessibility and scalability for a growing user base.

4.3 Software Support

Smart Resume AI relies on a collection of Python libraries and external tools to deliver powerful resume analysis, interactive dashboards, and seamless resume building.

Core Programming and Frameworks:

- **Python 3.10+** — The main language behind both the backend logic and frontend interface, chosen for its flexibility and rich ecosystem.
- **Streamlit** — Makes it easy to build interactive, data-driven web apps quickly and smoothly.
- **Pandas** — Handles data manipulation and makes it simple to work with large datasets.
- **Plotly** — Creates dynamic charts and graphs that enhance the user interface and make data easier to understand.

Additional Python Libraries:

- **Pillow (PIL)** — Used for image processing when needed, such as handling graphics.
- **Base64 & io** — Help with encoding files and streaming content for previewing and downloading resumes.
- **OpenPyXL** — Supports exporting reports to Excel format, handy for administrative users.
- **Requests** — Facilitates API calls, used here to bring in animations and other dynamic content.
- **python-docx** — Manages reading, editing, and generating Word documents, essential for creating polished resumes.

External Tools and APIs:

- **Google Fonts** — Improves typography and overall look of the app.
- **Font Awesome & Lottie** — Add icons and animations to create a more engaging and polished user experience.
- **Gemini AI API (optional/experimental)** — Potentially integrates advanced language models for even deeper resume analysis.

4.4 Documentation of the System

4.4.1 Program Documentation

The core of the app is managed by the `ResumeApp` class, which handles everything from page navigation and user input to processing data and displaying results. Key parts include:

- **Navigation Map:** Connects page names like "Home" or "Analyzer" to the functions that display those pages, making navigation smooth.
- **Component Functions:** Dedicated functions such as `render_home()`, `render_analyzer()`, and others handle the layout and logic for each part of the app.
- **Session Control:** Keeps track of user inputs and history to maintain a smooth and continuous experience.
- **Analysis Integration:** Links AI modules for resume evaluation to provide personalized feedback.
- **Resume Generation:** Uses a `ResumeBuilder` class to turn user data into professional, downloadable Word documents.

This modular setup keeps the code organized, easier to test, and maintainable.

4.4.2 Procedure Design

The system follows a user-friendly, event-driven flow with these main steps:

1. **Startup:** Loads fonts, initializes session data, connects to the database, and sets the starting page.
2. **Input Handling:** Collects user data from uploaded files or forms.

3. **Processing:** Runs AI evaluations or resume building tasks depending on what the user needs.
4. **Rendering:** Updates the interface in real time, so users always see fresh data.
5. **Storage:** Saves parsed resume data and analysis results securely in the database.
6. **Download:** Generates and delivers polished resume files on demand.

4.4.3 Operating System Compatibility

Smart Resume AI works across multiple platforms:

- **Windows:** Fully tested on Windows 10 and 11.
- **Linux:** Compatible with popular distributions like Debian/Ubuntu and Red Hat variants.
- **macOS:** Supports Monterey and newer versions.

It also runs smoothly in modern deployment environments such as Docker containers, GitHub Actions, and serverless Python hosting.

4.5 Input and Output Design

4.5.1 Home Page

The home page welcomes users and introduces the platform's main features with eye-catching animations, feature highlights, and smooth transitions — all designed to make a great first impression.

4.5.2 User/Admin Logic

Access is controlled through session variables to provide different experiences for regular users and administrators. While there isn't a full login system, admins can unlock advanced features by toggling specific flags.

4.5.3 Resume Builder Module

This guides users through filling out their resume details step-by-step, including:

- Personal info like name and contact details
- A brief professional summary
- Multiple entries for work experience, projects, and education with descriptions and dates
- Skills categorized by technical tools, soft skills, languages, and frameworks

Once complete, users can generate a professional-looking resume in Word format.

4.5.4 Resume Analyzer Module

Users upload their resume files (PDF or DOCX) and specify the job role they're targeting. They can also add a job description to improve analysis accuracy. The system then provides:

- ATS compatibility score
- Keyword matching percentage

- Formatting and layout evaluation
- Section-by-section improvement tips
- Recommended learning resources based on skill gaps

Visual feedback uses charts and graphs to make insights easy to grasp.

4.5.5 Feedback, Dashboard, and Job Search

- **Feedback Page:** Lets users submit comments or feature requests to help improve the app.
- **Dashboard:** Offers real-time analytics on resume trends, popular job roles, and AI usage through interactive charts.
- **Job Search:** Suggests job listings tailored to user preferences, connecting them directly to opportunities.

4.6 Database Design

4.6.1 User Table

User data is stored in SQLite tables, including:

- Personal details like name and email
- Resume contents covering skills, experience, and education
- Analysis metrics such as ATS scores and keyword matches
- Timestamp information for tracking and auditing

Data insertions are managed via functions like save_resume_data() and save_analysis_data(), ensuring that all user interactions are recorded accurately.

Column Name	Data Type	Description
user_id	INTEGER (PK)	Unique identifier for the user
full_name	TEXT	User's full name
email	TEXT (Unique)	User's email address (used for login/identity)
resume_file_name	TEXT	Name of uploaded resume file
score	INTEGER	Resume score from AI analysis
analysis_summary	TEXT	Summary/feedback from AI-based analysis

Column Name	Data Type	Description
date_uploaded	DATETIME	Timestamp when resume was uploaded
feedback	TEXT	User's feedback to the system
course_suggestions	TEXT	Recommended courses stored after AI suggestion

4.6.2 Supporting Tables

Several auxiliary tables enhance the overall functionality of the system:

- **resume_analysis:** Tracks scoring metrics for each analysis, providing a historical record of user interactions.
- **ai_analysis_stats:** Stores data about AI model interactions and performance, facilitating ongoing improvements and adjustments.
- **admin_log:** Logs critical administrative operations and resets, contributing to system accountability.
- **job_roles:** Defines job categories and role titles, ensuring that the system can recommend relevant positions accurately.
- **course_config:** Maps job roles to relevant courses or learning paths, aiding users in their career development efforts.

These supporting tables ensure data integrity, personalization, and long-term monitoring of the system's performance.

Column Name	Data Type	Description
id	INTEGER (PK)	Unique identifier for each record
total_resumes	INTEGER	Total number of resumes analyzed
avg_score	REAL	Average resume score
last_updated	DATETIME	Timestamp of the last update

CHAPTER 5: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

In this chapter, we bring together the main findings and outcomes from developing the Smart Resume AI web application. We'll revisit the project goals, key design decisions, technical work, and user-facing features. Then, we'll reflect on what worked well and what could be improved, ending with practical recommendations to make the platform even better. The focus is on expanding functionality, improving usability, and keeping the system relevant in the fast-changing world of AI-powered career tools.

5.1 Summary

Smart Resume AI was created to meet the growing demand from job seekers for intelligent tools that help build better resumes, offer personalized feedback, and improve the chances of

landing a job. Traditional resume tools often fall short—they lack guidance and flexibility, especially when it comes to navigating modern Applicant Tracking Systems (ATS).

This platform bridges that gap by combining a clear, step-by-step resume builder with an AI-powered analyzer and an easy-to-use interface. Key parts of the system include:

- **Resume Creation:** Users can enter their personal info, work history, education, skills, and projects in a structured way. Their data is saved throughout the session for a smooth experience.
- **AI Resume Analyzer:** Users upload resumes (PDF or DOCX), which the system reads and evaluates on criteria like keywords, formatting, ATS compatibility, and section completeness.
- **Job Role Matching:** The app matches resumes to relevant job roles based on internal data, then gives tailored advice to improve fit.
- **Visual Dashboards:** Real-time charts show users and admins how resumes score, popular roles, and usage trends, making data easy to understand.
- **Feedback System:** Users can share suggestions or report issues, helping the platform improve over time.
- **Modern UI:** The design uses custom fonts, icons, and animations for an engaging experience, and works well on various devices.

Built on Streamlit, the platform benefits from quick development and a modular structure that's scalable and easy to maintain. Overall, it helps users create professional resumes and get actionable AI feedback without needing technical skills or extra software.

5.2 Conclusion

Smart Resume AI shows how AI can transform resume building from a simple, static task into an interactive and data-driven experience. The system combines:

- **Natural Language Processing:** For extracting keywords and matching resume content.
- **Data Visualization:** To present feedback clearly.
- **User-Friendly Design:** Ensuring an enjoyable experience for users.
- **Database Management:** Keeping user data secure and accessible.

Its real value is in both helping users build resumes and evaluating them in ways similar to recruiters, which adds practical benefit. The feedback loop and analytics also allow the platform to grow and improve. Plus, its flexible design means it can integrate future features like job portals or support for multiple languages.

In essence, Smart Resume AI plays an important role in today's job market by helping users craft resumes that look great and perform well, giving insights that used to require career experts or costly services.

5.3 Recommendations

While the platform is already strong, here are some ways to make it better:

1. **User Accounts:** Adding secure logins would let users save multiple resumes, track progress, and get personalized suggestions over time.
2. **Cloud Hosting and Mobile Access:** Deploying the app on cloud platforms and optimizing for smartphones would widen its reach.
3. **Live Job Matching:** Linking to job boards like LinkedIn or Indeed could help users find relevant jobs directly through the platform.
4. **Multilingual Support:** Offering the app in more languages would make it accessible to a global audience.
5. **Advanced AI Models:** Using the latest AI tech could improve feedback quality and provide deeper insights.
6. **Gamification:** Adding features like badges or progress tracking could motivate users to improve their resumes continually.
7. **Cover Letter and Portfolio Tools:** Expanding features to help build cover letters and portfolios would create a complete job application toolkit.
8. **Privacy and Security:** Strengthening data protection and ensuring compliance with laws like GDPR would build user trust.
9. **Enhanced Admin Tools:** Improving dashboards and management tools would help administrators better monitor usage and address issues quickly.

With these improvements, Smart Resume AI can evolve into a powerful, all-in-one career development platform—serving users not only in Zimbabwe but worldwide.

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