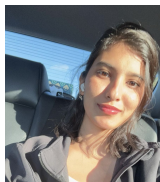# ResumeGenie: Intelligent Resume Optimization with LLMs

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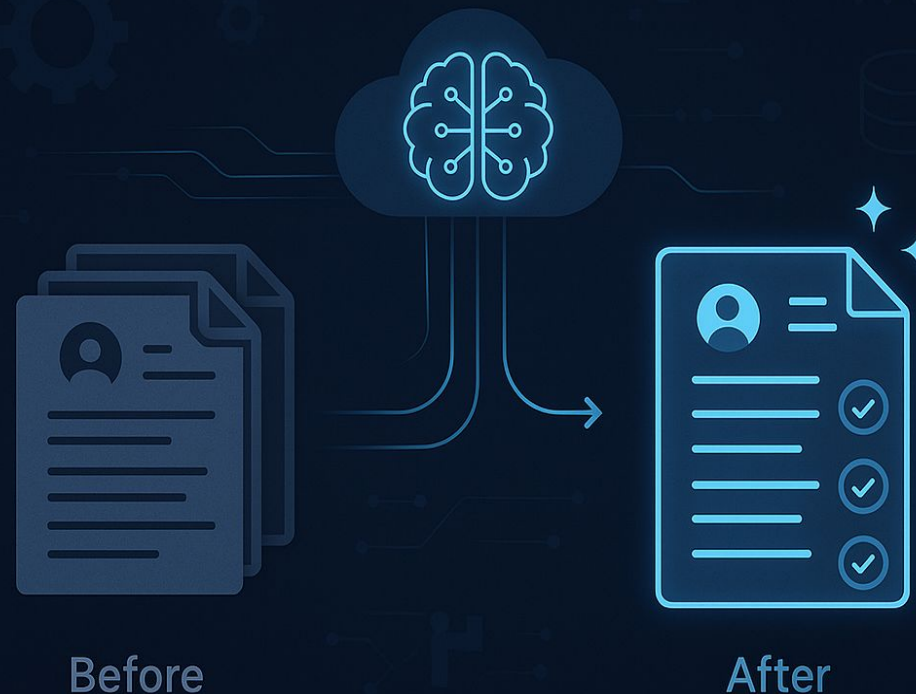- High-level Architecture
- Key Entities and Components

Deep Dive into the Solution Workflow

- PDF to JSON Parsing
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- RAG (Retrieval-Augmented Generation) for Smart Matching
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Before

After

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Why are we here?

Situation

The **job market** is highly **competitive**, and landing the right role is tougher than ever. On top of that, Applicant Tracking Systems (**ATS**) **filter out many resumes** before they even reach a recruiter.

Candidates need strong, ATS-compliant resumes to even get noticed.

Complication

Most resumes fail to stand out due to generic content and lack of strategic positioning. Creating a **structured**, **impactful**, and **keyword-optimized** resume for every application is **critical** — but time-consuming. Manually tailoring resumes to each job description is unrealistic when candidates need to apply to dozens of roles quickly.

Key Question

How can we leverage technology, especially LLMs, to **automate and personalize resume generation** – making every resume tailored, ATS-friendly, and impactful – to **maximize a candidate's chances** across multiple job applications?

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Solution Orchestration

Solution Orchestration

**Candidate Upload:** Raw input files (resume PDFs and Job Descriptions)

Parsing Layer: Resume parsing (PDF → JSON)

Prompt Engineering: Craft structured prompts for LLM based on parsed data

Matching & Ranking: Search and match using Vector Database (resume embeddings vs. job description embeddings)

Resume Generation: Fine-tuned resume generated (using LLM with engineered prompts)

Output: Downloadable final resume (JSON → PDF)

Streamlit Application

Candidate Upload

Parsing Layer

Matching & Ranking

Resume Generation

Output

Download

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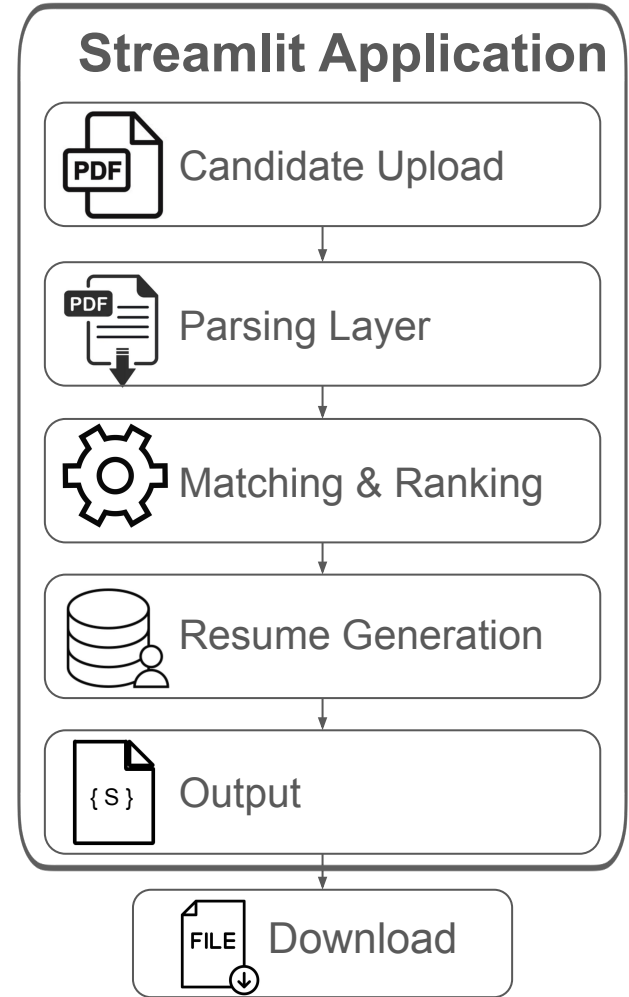
Deep Dive into the Solution Workflow

Parsing with PDFPlumber, Pydantic and ChatGPT-4o

- **PDFPlumber**
- Used to convert PDF to text

- **Pydantic**
- Used to specify desired JSON format
- Text lines get organized neatly into boxes { key: value }

- **ChatGPT-4o**
- Finally, text and format sent to LLM to produce JSON file
- Neatly formatted JSON file produced by the AI

PDFPlumber
Used to convert
PDF to text

Pydantic
Used to specify
desired JSON format

ChatGPT-4o
Text and format sent
to LLM to produce
JSON file

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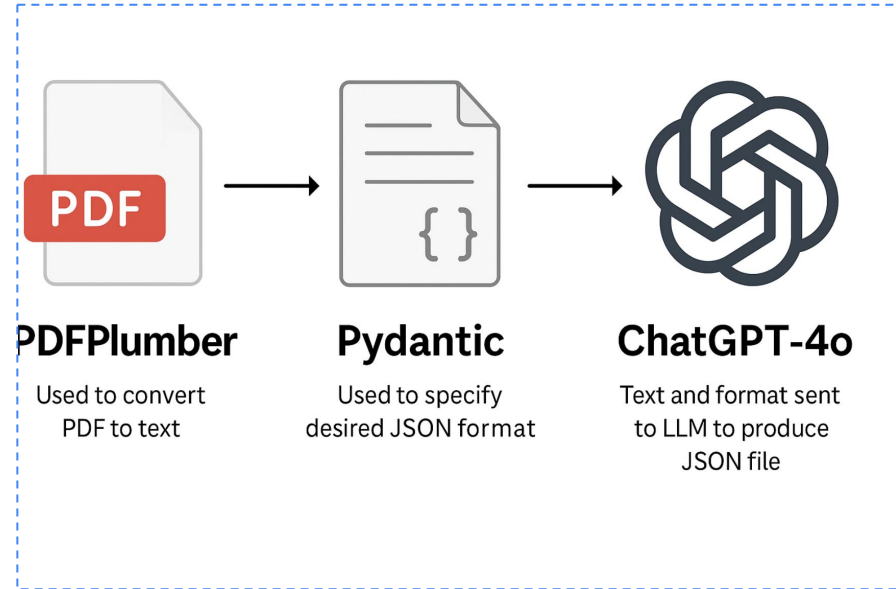
ChromaDB for Retrieval Augmented Generation (RAG)
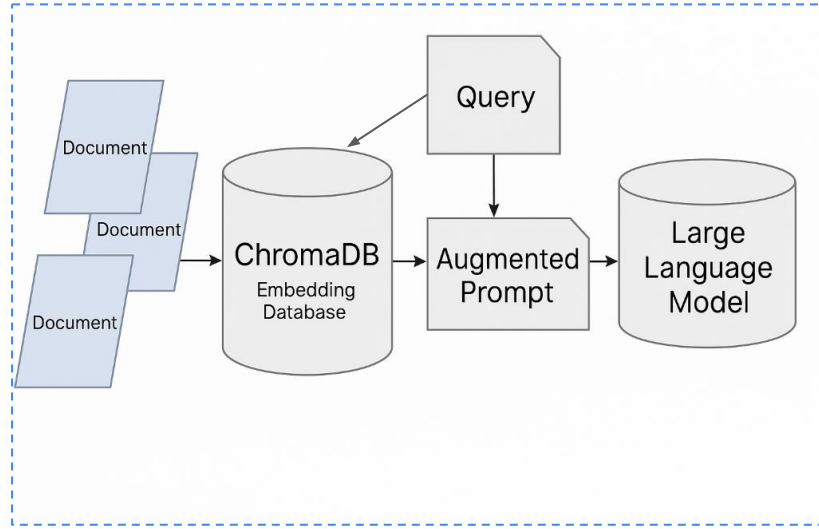
RAG Architecture
- Create a knowledge base for the LLM to reference
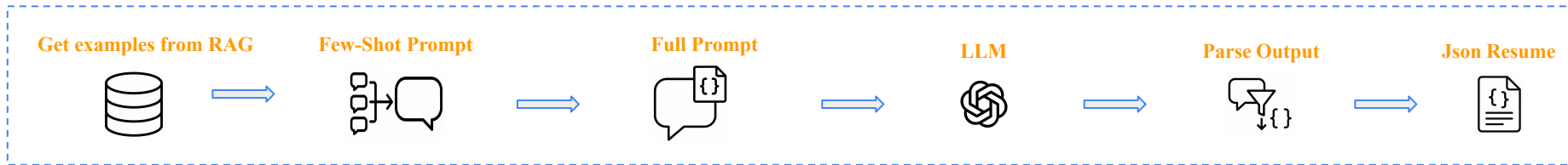- Reduce hallucinations by grounding responses to the retrieved information

ChromaDB
- Open source vector database
- Stores data as numerical vectors with embeddings
- Quickly queries relevant documents with similarity metrics

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Langchain Framework Flow

Get examples from RAG → Few-Shot Prompt → Full Prompt → LLM → Parse Output → Json Resume

Input Chain: Raw resume is ingested through a Chain with a custom **Prompt Template** to extract the major/field.

Retriever Query: A Retriever searches ChromeaDB for **top 2 similar resumes** based on the extracted field.

Few-Shot Prompt Assembly: Retrieved example resumes are inserted into a **Few-Shot Prompt Template** to condition the LLM.

Resume Generation Chain: The LLM generates an **ATS-friendly resume** using the few-shot examples and original input.

Output Parsing: An **Output Parser** ensures the generated resume has structured fields.

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Application Walkthrough and Result

Comparing Results

Left Resume

John Doe Los Angeles, CA
johndoe@usc.edu +1 (213) 999-9999

EDUCATION

University of Southern California, Master of Science - Computer Science — May 2025

Analysis of Algorithms, Deep Learning, Machine Learning for Data Science

University of Pittsburgh, Bachelor of Science - Mathematics and Economics — July 2022

Probability & Statistics, Linear Algebra, Applied Econometrics, Game Theory, Calculus 1-3

WORK EXPERIENCE

Mclearn Racing — Indianapolis

Data Engineer — August 2022 - July 2023

- Handled the receipt, cleaning, and preparation of data from clients using SAS, SQL, and Excel to assist data scientists in building marketing mix models that contributed to improved performance.
- Created a program in SAS that automated the refinement of linear regression models for different customer segments, streamlining routine processes and enhancing team efficiency.

SKILLS

- Programming: SAS (base SAS and Macros), SQL
- Supervised Learning: linear and logistic regressions, decision trees, support vector machines (SVM)
- Unsupervised Learning: k-means clustering, principal component analysis (PCA)
- Data Visualization: Excel, Google Sheets

PROJECTS

Fantasy F1 Modeling

- Wanted to stop losing at Fantasy F1 Manager so I aggregated and prepped 5 years of fantasy projection data into a MySQL database
- Built a random forest model in SAS that synthesized the various projections into a unified forecast, leading to improved predictive accuracy compared to other available methods.
- I had heck ton of points on it relative to my previous methodology

Strategy Recommendation Engine

- Aggregated data from F1nsight API and used k-nearest-neighbors in SAS to build a better recommendation system for making me predict wins
- I made better pitstop strategies while I play F1 Racing compared my previous methodology, making me win races.

Right Resume

John Doe

johndoe@usc.edu | | Los Angeles, CA

SUMMARY

Data scientist with expertise in SAS, SQL, and machine learning algorithms. Experienced in developing predictive models and data visualization techniques.

WORK EXPERIENCE

Data Engineer at Mclearn Racing
2022-08 – 2023-07

Handled the receipt, cleaning, and preparation of data from clients using SAS, SQL, and Excel to assist data scientists in building marketing mix models that contributed to improved performance.

Developed and implemented a program in SAS to automate the refinement of linear regression models for diverse customer segments, reducing processing time by 30% and enhancing team productivity. Collaborated with stakeholders to understand data requirements and built pipelines for data ingestion into the data lake.

EDUCATION

University of Southern California - Master of Science in Computer Science
– 2025-05
Analysis of Algorithms, Deep Learning, Machine Learning for Data Science

University of Pittsburgh - Bachelor of Science in Mathematics and Economics
– 2022-07
Probability & Statistics, Linear Algebra, Applied Econometrics, Game Theory, Calculus 1-3

SKILLS

Programming
SAS (base SAS and Macros) SQL Python C#

Machine Learning
Linear and logistic regressions Decision trees Support vector machines (SVM) Predictive analytics

Data Visualization
Power BI Excel Google Sheets

PROJECTS

Fantasy F1 Modeling

Aggregated and prepped 5 years of fantasy projection data into a MySQL database and built a random forest model in SAS.

Enhanced predictive accuracy by 20% compared to existing methods, resulting in a 15% increase in points relative to previous methodology.

Strategy Recommendation Engine

Aggregated data from F1nsight API and used k-nearest-neighbors in SAS to build a better recommendation system for predicting wins.

Optimized pitstop strategies in F1 Racing, contributing to a 10% increase in race wins.

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THANK YOU

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