University at Buffalo

AI Job Hunter

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AI Job Hunter: Personalised Resume and Cover Letter Tailoring Using Generative AI

1. Introduction

The modern job application process is increasingly digital, competitive, and often impersonal. Job seekers must tailor their resumes and cover letters for every opportunity, often without guidance or feedback, while recruiters sift through hundreds of applications, many of which are irrelevant due to poor keyword alignment.

AI Job Hunter addresses this gap by serving as a **personalized, AI-powered career copilot**. It streamlines the end-to-end application process by using intelligent resume-job matching, tailored resume bullet suggestions, impactful cover letter generation, and keyword analysis powered by NLP and LLMs. Designed for students, career switchers, and professionals alike, it empowers users to craft optimized applications with minimal effort and maximum relevance.

This project not only showcases how applied AI can simplify real-world career challenges but also demonstrates the business value of automation, personalization, and smart decision support.

2. Market Need

In today's hiring landscape:

- **85% of resumes** are rejected by Applicant Tracking Systems (ATS) before a human sees them (Jobscan, 2023).
- **72% of job seekers** struggle to tailor resumes and cover letters for each application (Zety, 2023).
- Companies spend an average of **$4,000+ per hire**—much of it on inefficient filtering and candidate matching (SHRM, 2023).

These statistics show a clear inefficiency in how candidates apply and how recruiters screen.

3. The Opportunity

AI Job Hunter fills a real gap:

- Automates repetitive, manual resume editing and cover letter writing.

- Aligns applications with job descriptions using keyword-based NLP and LLM insights.

- Enhances confidence and personalization for job seekers.

- Reduces recruiter burden by improving candidate-job fit before submission.

This platform is not just a tool, it's a smart assistant bridging the gap between raw talent and tailored presentation.

4. Target Segments

I. Early Career Job Seekers

- Age: 21–30

- Profiles: Students, fresh graduates, entry-level professionals

- Needs: Resume structure help, keyword tailoring, confidence boost

- Pain Points: ATS rejection, unclear expectations, time-consuming applications

II. Career Switchers / Mid-Level Professionals

- Age: 30–45

- Profiles: Professionals pivoting into tech, analytics, or management

- Needs: Rewriting outdated resumes, aligning past experience with new roles

- Pain Points: Lack of market-relevant language, difficulty mapping experience

III. Universities & Career Centers (B2B)

- Can offer this as a white-labeled service or integration

- Value: Improves student placement metrics and satisfaction

5. Features Implemented (In-depth View)

I. Resume-Job Match Score (TF-IDF + Cosine Similarity)

- **How it works**: Uses Term Frequency-Inverse Document Frequency **(TF-IDF)** to convert

both the resume and job description into weighted word vectors.

- TF-IDF boosts the weight of rare but relevant words in the job description while reducing common ones (like "the", "a", "is").

- **Cosine similarity** then measures the angle between the two vectorized texts to generate a percentage match score.

- **Use Case**: A resume that aligns more closely to a job description will have a match score > 70%.

II. Missing Keyword Detection

- **How it works**: Applies regex and natural language preprocessing to extract nouns and verbs from the job description and resume.

- Compares both sets and highlights words present in the JD but absent in the resume.

- Uses a custom stopword bank to remove irrelevant terms.

- Prioritizes keywords using a weight model based on importance (business terms, technical skills).

- **Output**: Top 10 business-relevant and **ATS-friendly missing keywords.**

III. Resume Tailoring (Smart Phrase Bank + GPT Enhancement)

- **Smart Phrase Bank**:
  - A curated collection of 30+ professionally written bullet point templates.
  - Dynamically populates missing keywords into these templates to generate impactful bullet points.

- **LLM Enhancement**:
  - Uses GPT-3.5 to rephrase or generate resume bullets with action verbs and metric-based impact.
  - Example: "Automated weekly data pipeline using Python, reducing processing time by 40%."

IV. Tailored Cover Letter Generator

- **How it works**:
  - User enters the job title and company name.
  - The model pulls in impact statements extracted from the resume using pattern

matching (e.g., keywords like "improved", "led", "optimized").

- o A complete cover letter is generated including:
    - Introduction aligned to the role
    - Highlight of value propositions from the user
    - Polished and professional closing
- **LLM Extension**:
    - o GPT can optionally rewrite the letter to match tone (formal, energetic, concise).

V. Final Smart Summary Report

- **How it works**:
    - o Compiles all outputs into a concise assessment:
    - o Resume-Job Match Score
    - o Matched vs. Missing Skills
    - o Number of Achievements Extracted
    - o Resume Readiness Score (out of 5 stars)
- **Use Case**: Helps user self-diagnose and measure improvement across applications

6. How the Technology Works

I. TF-IDF Vectorization

- Converts text into numerical values that reflect how important a word is to a document in a corpus.
- Words common to both resume and JD get higher similarity scores if they are also rare across general language.

II. Keyword Extraction

- Text is split into tokens using regex.
- Custom stopword list removes irrelevant tokens.
- Remaining words are ranked by length and match to the predefined business keyword list.

III. Business Keyword Weighting

- Custom logic applies higher weight to impactful, ATS-relevant terms (e.g., "SQL", "KPI",

"Strategy").

- Uses a `keyword_weight()` function to sort terms based on business priority.

IV.   Smart Phrase Bank

- Acts like a human resume coach.
- Takes top missing keywords and wraps them into professional bullet templates like:
    - "Led initiatives applying {skill} to optimize outcomes."
    - "Enhanced analysis with {skill}, improving decision-making speed."

V.   Cover Letter Generator

- Simple template engine that dynamically fills in:
    - Job title
    - Company name
    - Achievements/impacts
- Uses GPT for optional polish and human-like tone

7. LLM Model Integration

- **Model**: GPT-3.5 (via OpenAI API)
- **Uses**:
    - Refining resume bullet points with metric-based achievements
    - Generating cover letter paragraphs using resume input
    - Writing personalized summaries for each job

8. Business Impact

For Job Seekers:
- Saves 2–3 hours per job application
- Helps break through ATS filters
- Boosts confidence and improves call-back rates

For Hiring Platforms/Universities:
- Provides scalable job coaching
- Enhances placement support with automated tailoring tools
- Increases student job readiness at scale

9. Competitive Benchmark

Feature	ChatGPT	Microsoft CoPilot	Gemini	AI Job Hunter
Resume Match Score	❌	❌	❌	✅
Missing Keyword Detection	❌	❌	❌	✅
Resume Tailoring Engine	⚠️ Manual	⚠️ Basic	❌	✅ Automated
Cover Letter Generator	✅ Prompt-based	⚠️ Basic	✅	✅ Tailored
Final Score Report	❌	❌	❌	✅
Offline Use Option	❌	❌	❌	✅

10. Technologies Used

- **Python** (core logic)
- **Scikit-learn** (TF-IDF vectorizer)
- **Streamlit** (UI layer)
- **PyPDF2 / python-docx** (file parsers)
- **OpenAI GPT API** (text generation)
- **Regex + NLP techniques** (custom keyword extraction)
- **Custom Smart Phrase Bank** (resume tailoring)

11. Conclusion

The AI Job Hunter proves how practical, impactful, and manager-friendly AI can be. It transforms the job application journey by:

- Reducing manual effort
- Increasing resume precision
- Enhancing applicant visibility

By combining machine learning with a business-oriented UX, the platform empowers users to navigate the job market with clarity and confidence.
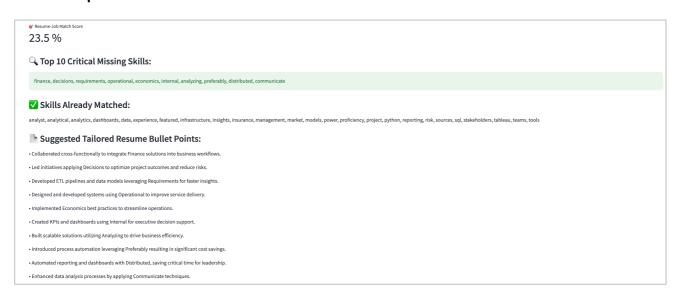
12. Appendix

Streamlit User Interface

I.   Input:

🚀 **AI Job Hunter - Personalized Career Copilot**

Optimize your Resume and Cover Letter using Professional AI Insights!

Upload your Resume (.pdf, .doc, .docx, .txt)

☁	Drag and drop file here Limit 200MB per file • PDF, DOC, DOCX, TXT	Browse files

Upload your Job Description (.pdf, .doc, .docx, .txt)

☁	Drag and drop file here Limit 200MB per file • PDF, DOC, DOCX, TXT	Browse files

OR Paste your Resume text below:

OR Paste your Job Description text below:

✏ Enter Job Title (example: Data Analyst)

✏ Enter Company Name (example: Amazon)

🚀 Analyze Now

II.   Output:

🎯 Resume-Job Match Score

23.5 %

🔍 **Top 10 Critical Missing Skills:**

finance, decisions, requirements, operational, economics, internal, analyzing, preferably, distributed, communicate

✅ **Skills Already Matched:**

analyst, analytical, analytics, dashboards, data, experience, featured, infrastructure, insights, insurance, management, market, models, power, proficiency, project, python, reporting, risk, sources, sql, stakeholders, tableau, teams, tools

📄 **Suggested Tailored Resume Bullet Points:**

• Collaborated cross-functionally to integrate Finance solutions into business workflows.

• Led initiatives applying Decisions to optimize project outcomes and reduce risks.

• Developed ETL pipelines and data models leveraging Requirements for faster insights.

• Designed and developed systems using Operational to improve service delivery.

• Implemented Economics best practices to streamline operations.

• Created KPIs and dashboards using Internal for executive decision support.

• Built scalable solutions utilizing Analyzing to drive business efficiency.

• Introduced process automation leveraging Preferably resulting in significant cost savings.

• Automated reporting and dashboards with Distributed, saving critical time for leadership.

• Enhanced data analysis processes by applying Communicate techniques.

✉️ Tailored Cover Letter:

Tailored Cover Letter Output

I am excited to apply for the Data Analyst position at Futura Energy Group . With a proven track record of delivering measurable results and technical excellence, I am confident in my ability to contribute meaningfully to your organization.

Here are some highlights of my impact:
- • Reduced reporting errors by 30% by identifying gaps and optimizing data pipelines
- • Cut manual report generation time by 40% and enhanced clinical decision -making by designing interactive Power BI
- • Optimized policy decision -making by delivering insights using SQL, Hive, and PySpark in collaboration with actuarial teams
- • Enhanced data accuracy by 95% through the development of a QA Tableau tool, leading training sessions to improve team
- • Enhanced credit risk assessments and optimized loan decision processes, awarded Grade A for project

Thank you for considering my application. I look forward to discussing how my experience aligns with your team's goals.

⬇️ Download Cover Letter as .txt

📃 Final Smart Summary Report

◆ Resume-Job Match Score: 23.5%

◆ Skills Matched: 25

◆ Critical Missing Skills: 10

◆ Impactful Achievements Identified: 5

⭐ Overall Resume Readiness Rating: 1/5 Stars