Automated Candidate Background Verification using Multi-Agent System

Index

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Problem Statement:

In the modern recruitment ecosystem, organizations receive thousands of job applications every month. Verifying every candidate's credentials manually — including education, employment history, identity, and criminal background — is both time-consuming and error-prone.

Traditional background verification processes involve multiple stakeholders and rely on manual cross-checking through third-party services, which often causes delays in hiring and increases operational costs.

Objective:

To design and implement an **AI-powered Automated Background Verification System** that uses **Multi-Agent Architecture** to validate candidate information across various domains such as education, employment, identity, and criminal records.

This system ensures faster, more reliable, and transparent verification using a structured agent-based approach, reducing human intervention and improving overall accuracy.

Solution Concept:

A **multi-agent system** can automate and accelerate the background verification process by dividing tasks among specialized agents, each handling a part of the workflow.

Background verification is a process many organizations carry out in order to verify the information provided by the candidate during hiring. It involves various checks in which the employer will go through your education records, past employer details, identity checks, resume checks and address checks.

Project Category: AI Chatbot + Decision Automation System

This project falls under a **chatbot-based multi-agent system** that performs automated verification tasks through different intelligent agents. Each agent performs a specific type of verification using given candidate data and returns structured results.

Types of Agents Used:

1. **Resume Verification Agent** – Checks for skills, experience, and project authenticity.

2. **Education Verification Agent** – Validates the legitimacy of educational institutions.

3. **Employment Verification Agent** – Confirms previous employer details and job duration.

4. **Identity Verification Agent** – Verifies name, email, and phone consistency.

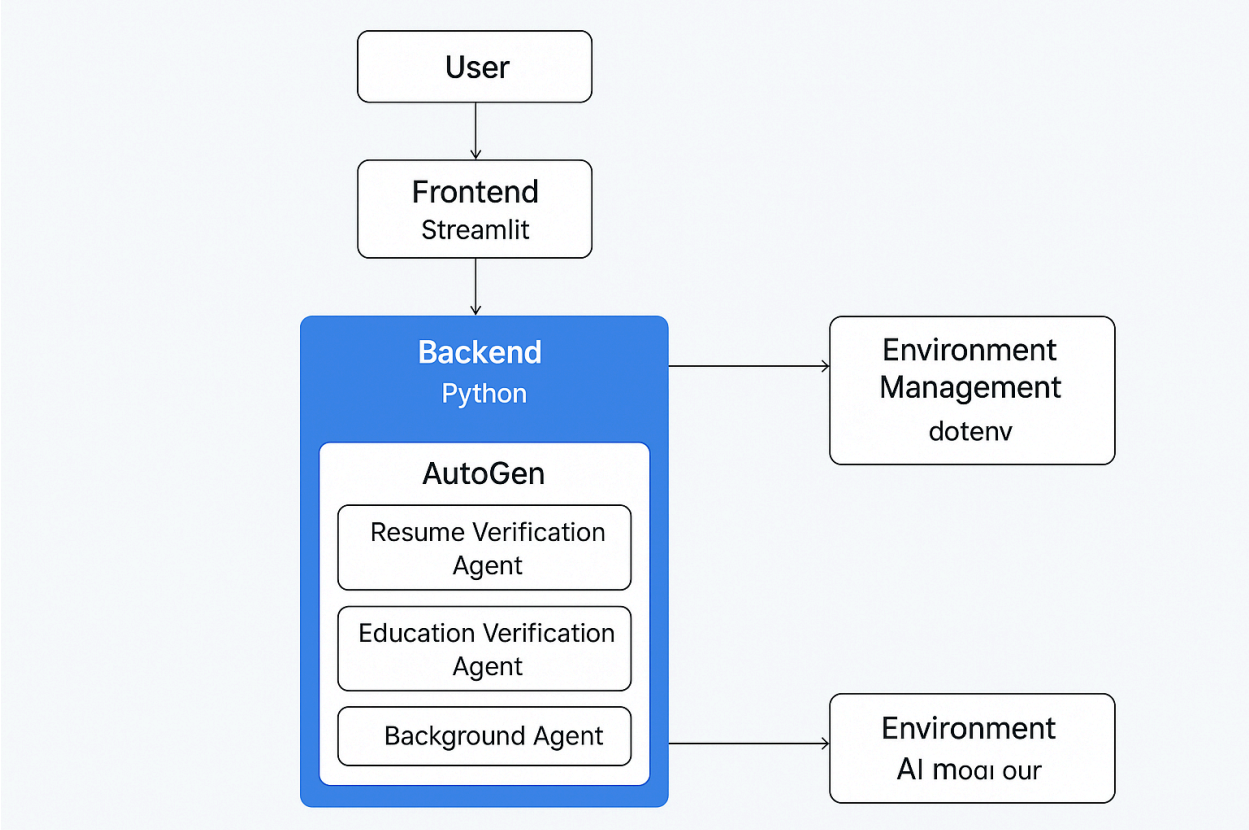
5. **Address Verification Agent** – Validates address format and correctness.

6. **Criminal Record Agent** – Checks if the candidate has any public criminal records.

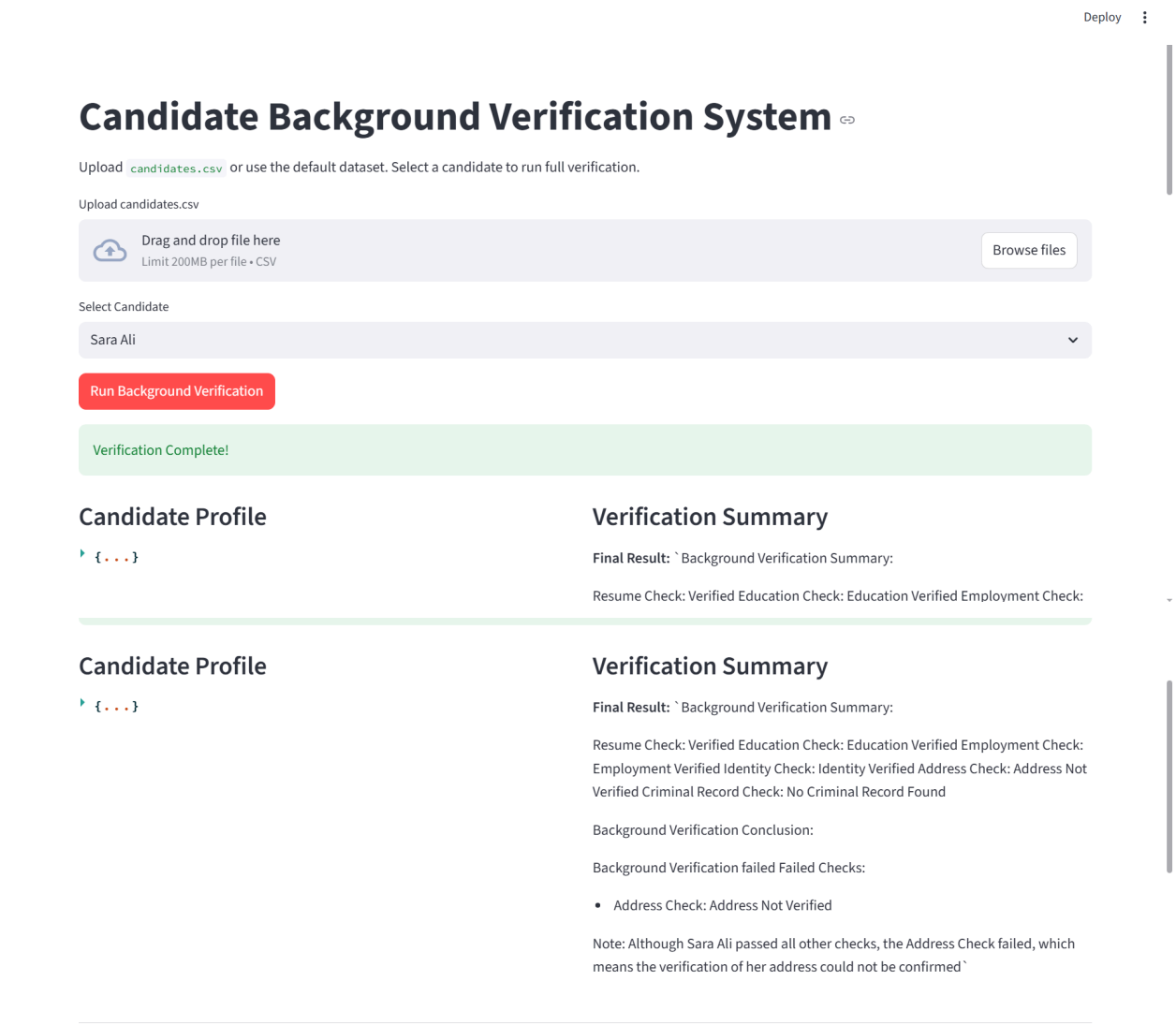
7. **Background Coordinator Agent** – Compiles all reports and gives the final decision.

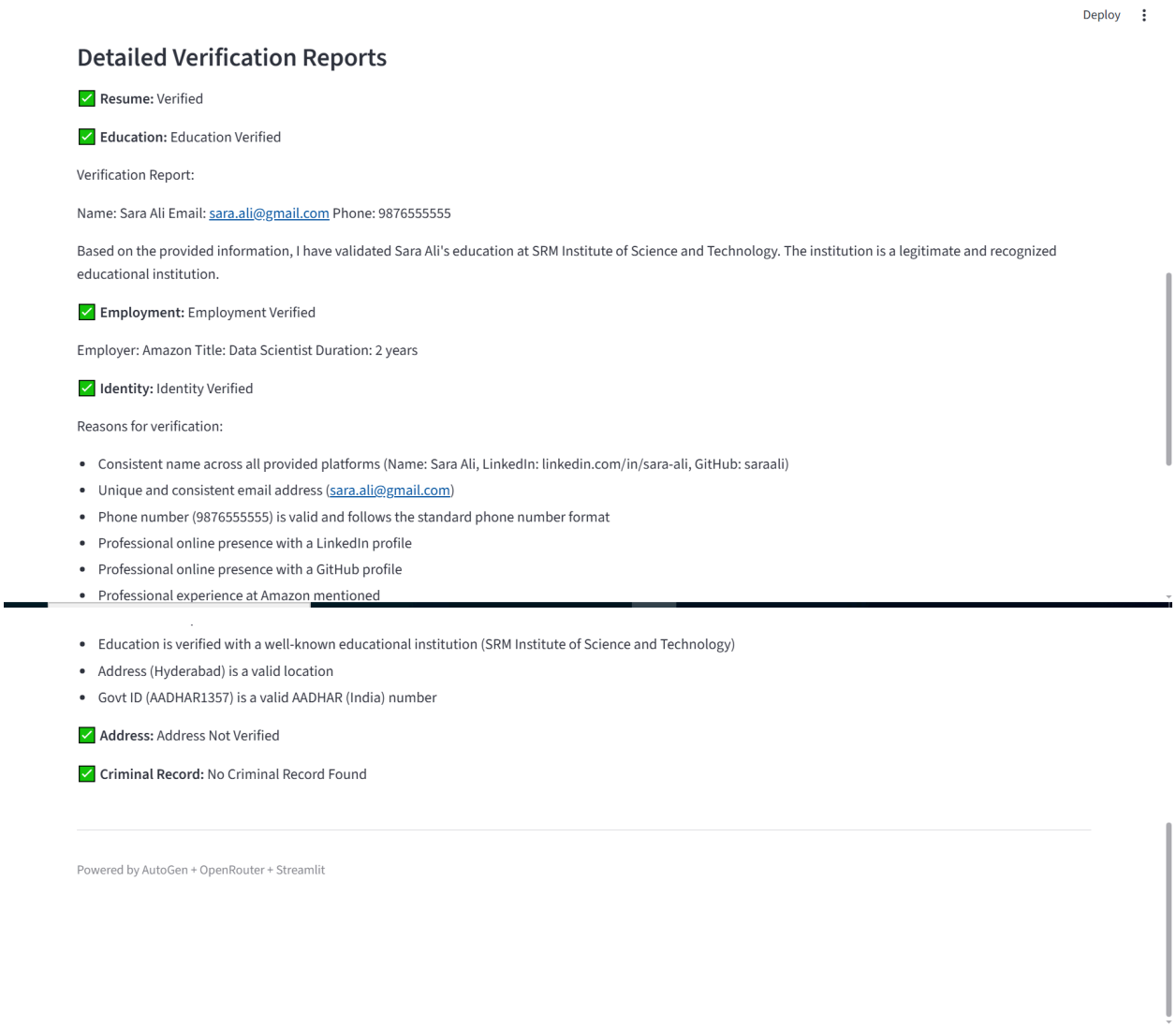
This modular approach allows scalability and parallel execution of verification tasks.

Architecture Diagram



How my UI looks





Tech Stack Used

Component	Technology Used	Purpose
Programming Language	Python 3.10+	Core logic and backend implementation
Frontend	Streamlit	UI for HR dashboard
AI Model	Meta LLaMA 3 (via OpenRouter)	Natural language reasoning and decision-making

Framework	AutoGen	Multi-agent coordination and LLM communication
Environment Management	dotenv	Secure API key handling
Version Control	GitHub	Repository and team collaboration

Challenges and Future Enhancements:

Challenges:

- Limited access to real-world verification APIs for criminal/education data.
- Handling false positives from incomplete candidate records.
- Ensuring data privacy and GDPR compliance.

Future Enhancements:

- Integration with **official APIs** (e.g., DigiLocker, NSDL, UIDAI).
- Adding **face verification** using Azure Face API.
- Building a **voice-based HR chatbot** for candidate queries.
- Enhancing the model with **retrieval-augmented generation (RAG)** for contextual validation.

Conclusion

The **Automated Candidate Background Verification using Multi-Agent System** streamlines the hiring process by intelligently distributing verification tasks among specialized AI agents.
By integrating **AutoGen** and **OpenRouter-based LLMs** within a **Streamlit + Azure** ecosystem, the system achieves automation, scalability, and reliability.

This innovation not only minimizes manual effort but also enhances organizational trust by ensuring that every candidate's credentials are authenticated through a transparent, explainable, and efficient AI-driven verification pipeline.