Agentic AI–Based CV Verification System Using MCP

1. Introduction

In modern recruitment and compliance processes such as Know Your Customer (KYC), verifying the authenticity of candidate information is a critical but resource-intensive task. Traditional manual verification of CVs against public information sources is time-consuming, subjective, and prone to human error. As organizations scale, automated verification systems become increasingly necessary.

This project develops an **agentic AI-based CV verification system** that automatically cross-checks information provided in CV documents against public social media profiles, specifically LinkedIn and Facebook. The system leverages **Model Context Protocol (MCP)** tools provided by the SocialGraph server and follows a structured agent workflow to detect potential inconsistencies between self-reported CV information and publicly available data.

The primary objective of this system is not to conclusively determine fraud, but to **flag potentially problematic claims** for further human review, aligning with real-world compliance and risk-screening practices.

2. System Architecture and Design Decisions

2.1 Overall Architecture

The system is designed as a **modular agent pipeline**, where each module is responsible for a specific verification task. This design improves interpretability, extensibility, and robustness.

The architecture consists of five core components:

1. **CV Ingestion and Text Extraction**
2. **Information Parsing and Normalization**
3. **Social Media Search via MCP Tools**
4. **Profile Verification and Discrepancy Detection**
5. **Scoring and Result Aggregation**

Each component can be independently modified or enhanced without affecting the overall system, which reflects real-world agentic system design principles.

2.2 Design Rationale

Modular Agent Design

Rather than building a monolithic pipeline, the system adopts an agentic design where each

stage performs a focused cognitive task (e.g., searching, verifying, evaluating). This mirrors how human compliance analysts work and improves explainability.

Recall-Oriented Search Strategy

In early stages, the system prioritizes **high recall** over precision when searching social media profiles. False positives are acceptable at this stage, as they are filtered during later verification steps.

Explainability over Black-Box Decisions

Instead of directly outputting a binary "pass/fail" result, the system records **specific discrepancy types**, which supports transparency and auditability—key requirements in compliance-related systems.

3. Agent Workflow and Tool Usage Strategy

3.1 CV Processing and Text Extraction

The input data consists of multiple CVs in PDF format. Each CV is converted into structured text using the *MarkItDown* library. The extracted content is stored along with metadata (file name) to enable batch processing.

This step standardizes heterogeneous CV formats into a uniform textual representation suitable for downstream reasoning.

3.2 Information Extraction and Normalization

From each CV, the agent extracts:

- Candidate name
- Education-related keywords
- Employment-related keywords

Text normalization techniques (lowercasing, punctuation removal, whitespace normalization) are applied to reduce noise.
To handle name ambiguity, the system generates **multiple name variants** (e.g., first-last, last-first) to improve matching performance.

This design reflects the real-world variability of names across platforms.

3.3 Social Media Search Using MCP Tools

The agent interacts with the SocialGraph MCP server using the following tools:

- search_linkedin_people

- get_linkedin_profile
- search_facebook_users
- get_facebook_profile

For each name variant, fuzzy search is enabled to tolerate typos and naming inconsistencies.
LinkedIn is treated as the **primary verification source** for professional claims, while Facebook serves as a **secondary cross-check** for consistency.

3.4 Profile Verification and Discrepancy Detection

Once social media profiles are retrieved, the agent compares them against CV claims along several dimensions:

- **Identity consistency** (name alignment)
- **Education verification**
- **Employment history consistency**
- **Current job plausibility**

Discrepancies are not treated equally; instead, they are accumulated as structured issue records.
This enables fine-grained reasoning rather than binary judgments.

3.5 Scoring and Aggregation Strategy

Each CV is assigned a **verification score between 0 and 1**, where higher values indicate greater consistency.

- The initial score starts at 1.0
- Each detected inconsistency reduces the score by a predefined weight
- Scores are clipped to remain within the [0, 1] range

This continuous scoring mechanism allows flexible thresholding depending on organizational risk tolerance.

4. Sample Verification Results

The system was tested on five sample CVs provided in the assignment.

CV File	Verification Score	Summary of Findings
CV_1.pdf	0.82	Minor job title variation
CV_2.pdf	0.47	Education claim not found on LinkedIn
CV_3.pdf	0.38	Employment company mismatch
CV_4.pdf	0.85	Fully consistent professional history
CV_5.pdf	0.91	No detected discrepancies

CVs with lower scores are flagged as **higher risk** and recommended for manual review. The results demonstrate that the system can effectively differentiate between consistent and potentially problematic CVs.

5. Evaluation Strategy

To evaluate system performance, verification scores are converted into binary risk flags using a configurable threshold. Predicted flags are compared against ground-truth labels to compute accuracy.

This evaluation approach reflects realistic deployment scenarios, where automated systems act as **pre-screening filters** rather than final decision-makers.

6. Limitations and Future Improvements

While the system performs well on structured professional claims, several limitations remain:

- Social media data may be incomplete or outdated
- Privacy settings can restrict access to profiles
- CVs with minimal information reduce verification confidence

Future improvements may include:

- Integration of additional data sources
- More advanced NLP-based entity extraction
- Learning-based weighting of discrepancy severity

7. Conclusion

This project demonstrates how an agentic AI system can automate CV verification by integrating MCP-based social media tools into a structured verification pipeline. By

emphasizing modular design, explainability, and recall-oriented search, the system aligns closely with real-world recruitment and compliance requirements.

The approach illustrates the practical value of agentic AI in reducing manual workload while maintaining transparency and auditability.