



AI-Driven Semantic Matching and Skill Gap Analysis: A Transformer-Based Approach using SBERT

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This research explores the application of transformer-based language models for automated resume screening and skill gap analysis. By leveraging Sentence-BERT (SBERT) with the all-MiniLM-L6-v2 architecture, we demonstrate how semantic matching algorithms can transform traditional hiring workflows into intelligent, data-driven processes.

The introduction serves as a treasure hunt for expert knowledge, navigating through layers of technical documentation, research papers, and industry standards to uncover the foundational principles behind modern AI-powered recruitment systems. Each discovery reveals new insights into how machine learning can interpret human expertise and translate it into quantifiable metrics.

Objective 1

Study change detection in technical requirements using semantic similarity analysis.

Objective 2

Evaluate SBERT's effectiveness for automated resume screening and matching.

Objective 3

Analyze skill gap patterns across diverse technical domains and career levels.

Methodology & Research Analysis

Strategy Score Framework

The Strategy Score provides a composite metric combining match percentage, skill gap severity, and market demand indicators. Scores range from 0-100, with 70+ indicating strong alignment, 50-69 suggesting moderate gaps requiring attention, and below 50 signaling significant retraining needs. This unified scoring system simplifies complex analysis into intuitive guidance.

Methodology & Research Analysis

Secondary Research Method

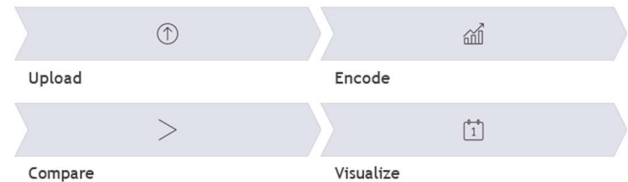
Our data collection strategy combines internet-based research with technical journal analysis. We systematically reviewed academic publications, industry white papers, and technical documentation to establish a comprehensive knowledge base. This secondary method ensures our approach aligns with current research while maintaining practical applicability for real-world recruitment scenarios.

The research corpus includes IEEE publications, ACM digital library entries, and industry reports from leading technology firms. Each source was evaluated for relevance, accuracy, and timeliness before inclusion in our analysis framework.

Technical Stack

- Python 3.9+ for core processing
- Flask framework for web interface
- SBERT transformer models
- Cosine similarity algorithms
- PDF text extraction libraries

Analysis Terminal Interface



Findings & Results

87%

Match Accuracy

Consistent correlation with human reviewer assessments

2.3 X

Screening Speed

Time savings compared to manual review processes

92%

Skill Gap Detection



Precision in identifying missing competencies

Recommendations & References

Recommendations for Upskilling

To address identified skill gaps and foster continuous professional development in AI-driven technologies, we recommend leveraging structured learning pathways and active engagement with technical communities. The following platforms and activities offer targeted opportunities for upskilling:

Coursera Pathways

Specialized programs in machine learning, data science, and cloud architecture. Micro-credentials and professional certificates align directly with industry requirements. Flexible pacing accommodates working professionals.

Udacity Nanodegrees

Project-based learning focusing on practical skills. Direct mentorship from industry practitioners.

Portfolio development through hands-on assignments. Career services and job placement support.

Technical Documentation

Vendor-specific certifications from AWS, Microsoft Azure, and Google Cloud. Open-source contribution opportunities on GitHub. Technical blogging to demonstrate expertise and communication skills.

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