

Title: Data-Driven Method for Job Matching and Resume Screening Using NLP & Machine Learning

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Flowcharts for Recruitment Processes

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Background & Research Context

- The hiring procedure becomes inefficient when there are a lot of resumes [1], [2].
- Basic keyword filtering is frequently used in ATS systems and traditional manual screening, which can overlook contextual subtleties [1], [2].
- Advanced Techniques Are Needed: Combining NLP and ML will greatly expedite candidate selection and lessen human bias [4], [7].
- The potential for improved recruitment strategies is highlighted by the growing use of data-driven approaches in HR [9].

Research Problem (Gap in Literature)

Statement of the Problem:

- In addition to being time-consuming, manual resume screening is prone to errors, which may result in a mismatch between job responsibilities and candidates [1], [2].
- Conventional ATS systems frequently overlook context and semantic significance in favor of keyword matching [3], [7].
- Research on thorough NLP and ML integrations for resume-job matching is few [2], [5], according to the identified literature gaps.
- a dearth of techniques that handle candidate profiles' quantitative evaluation as well as their semantic context [3], [4].
- Emphasis: Drawing attention to these gaps shows a thorough comprehension of current issues and the demand for creative solutions. [1], [2], [3].

Aim and Objectives of the Research

- **Aim:** Use cutting-edge NLP and ML approaches to create a solid, data-driven model that matches applicants to job vacancies precisely and automates resume screening [3], [7].

Objectives:

- To Utilize cutting-edge NLP approaches to gather and preprocess a variety of résumé data, identifying pertinent aspects [4], [5].
- To ensure precise candidate categorization and matching, create, train, and assess machine learning models (such as SVM, Bi-LSTM, and Naïve Bayes) [7], [8].
- To use comprehensive metrics (accuracy, precision, F1 score) to compare the suggested model to conventional approaches and confirm that it is effective in cutting down on bias and screening time. [6], [9].

Literature Review

Current Methods:

- NLP and ML-based automated resume screening has demonstrated encouraging outcomes in terms of lowering manual labor [4].
- Frameworks for job matching and resume parsing demonstrate how keyword-based systems gave way to semantic analysis methods [1], [8].

Comparative Analysis:

- Research shows that employing ensemble approaches and deep learning models like Bi-LSTM significantly improves candidate-job matching [3], [6].
- Significant improvements in screening process efficiency are shown by sophisticated frameworks that use LLM [9].

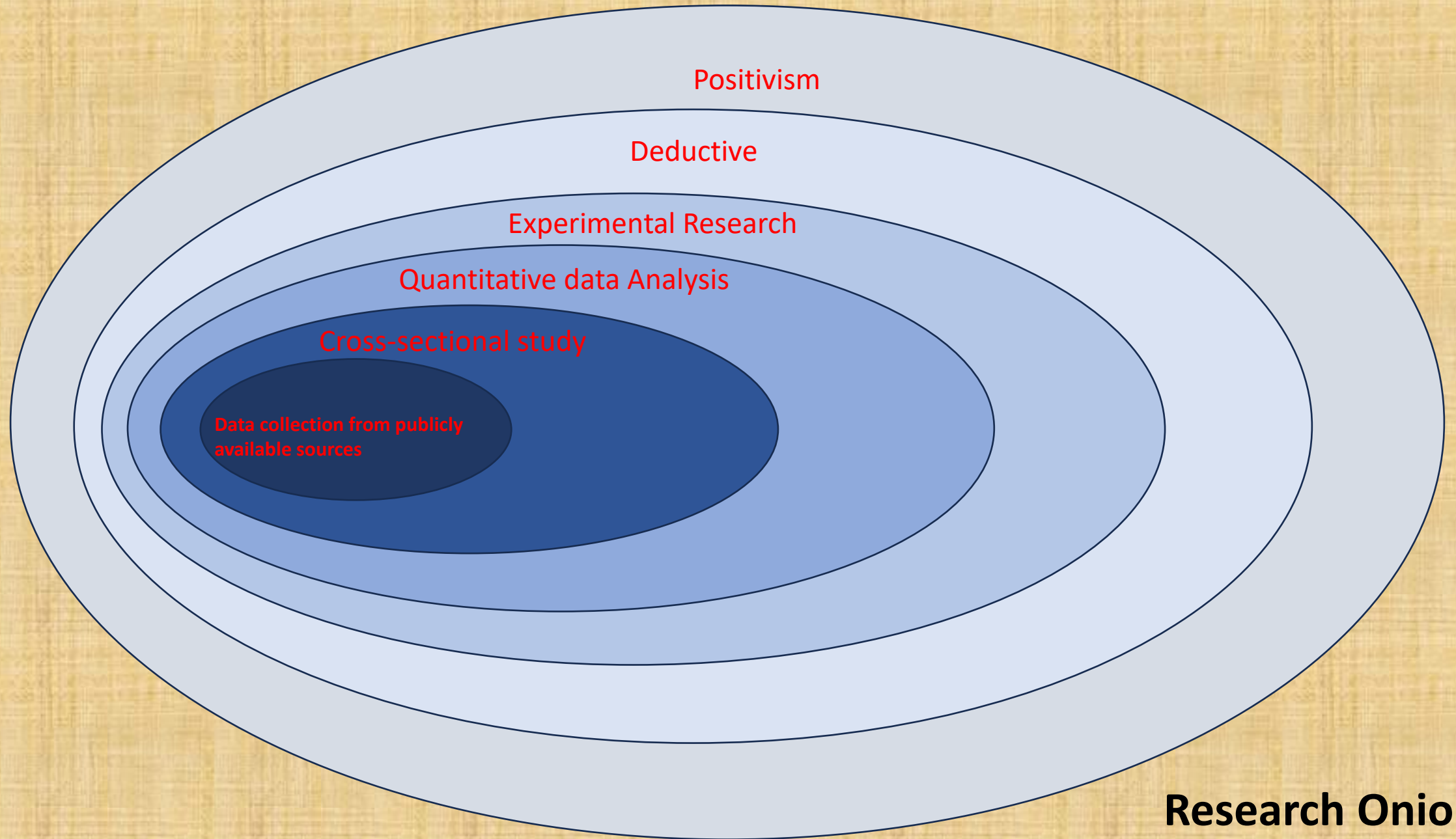
Domain insights: A clear research gap in fully integrated, end-to-end systems is indicated by the literature's substantial coverage of various machine learning algorithms and their effects on resume analysis [2], [5].

Emphasis: To get beyond the drawbacks of current systems, the review emphasizes the significance of fusing conventional methods with cutting-edge NLP developments [3], [4].

Research Methodology

Research Onion Framework :

- 1) **Philosophy:** Positivism because the study will use predictive modeling and quantitative data.
- 2) **Method:** Deductive, as I will use machine learning models to test predetermined assumptions.
- 3) **Strategy:** I will develop and assess a resume-job matching model using experimental research.
- 4) **Methods:** quantitative data analysis, machine learning for classification, and natural language processing (NLP) for text processing.
- 5) **Time Horizon:** Cross-sectional study with an emphasis on pre-existing datasets of resumes.
- 6) **Methods & Procedures:** gathering data from openly accessible sources, preprocessing, training, assessing, and visualizing machine learning models.



Research Onion

Resources & Project Planning

Project Schedule:

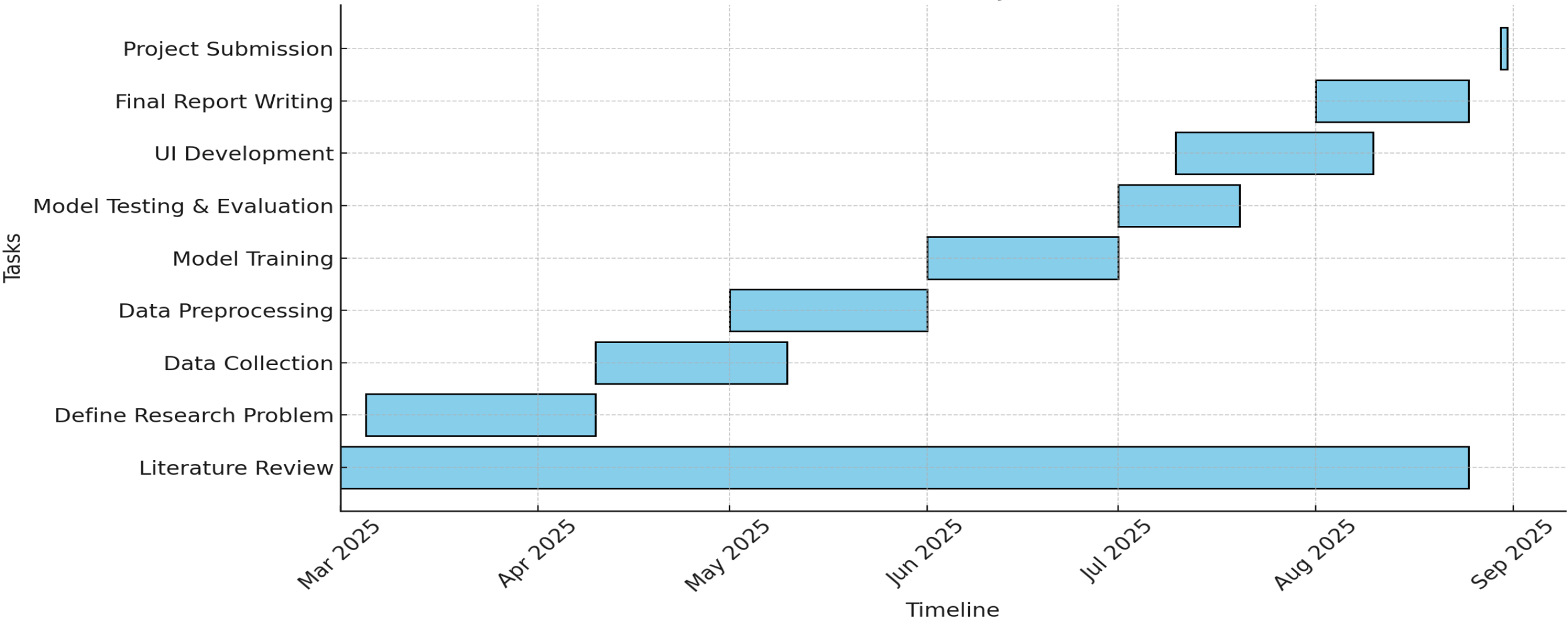
Phase 1: Data Gathering and Preprocessing for Natural Language Processing [4], [8].

Phase 2: Training and model development [7].

Phase 3: Benchmarking, validation, and assessment [6].

Phase 4: Documentation and deployment [9].

Gantt Chart for Project Timeline



Resources

- **Software:** NLP libraries (SpaCy, NLTK, Transformers) and Python [4].
- **Hardware:** ML model training with high-performance computers [7].
- **Team expertise:** ML and NLP domain experts [3].

Impact of the Project and Its Limitations

Anticipated Effect:

1. A notable decrease in screening duration and an improvement in the precision of candidate-job matching [6], [9].
2. reduced bias and increased fairness in the hiring process [1], [2].
3. scalable and flexible strategy that works in a variety of sectors [7].

Constraints:

1. Reliant on the caliber and variety of supplied data [5].
2. Difficulties managing resume material that is unstructured and in several formats [4].
3. Performance of the model varies depending on the domain [8].

Future Directions:

To handle changing recruitment issues, sophisticated LLM integration and ongoing model improvement are needed [9].

References (IEEE Format)

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Thank You !!!

Any Questions please...