**I. Introduction**

**Context and problem statement**

Rise of AI in HRM and automation in recruitment processes (Tambe et al., 2019).

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Persistent issues of algorithmic bias in resume screening (Raghavan et al., 2020).

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**Research gap**

Lack of scalable and auditable frameworks that operationalize Responsible AI principles in recruitment (Jobin, Ienca, & Vayena, 2019).

Existing tools often overlook bias mitigation at the preprocessing and output stages.

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**Objective**

To design and evaluate a bias-free, scalable AI model—FairHire—for responsible resume screening.

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. (Three objectives)

**II. Literature Review**

AI and automation in HRM

AI’s growing role in recruitment and talent acquisition (Meijerink, Bondarouk, & Lepak, 2020).

Existing ATS (Applicant Tracking Systems) and their limitations.

Bias in AI systems

Sources of bias: training data, algorithmic design, output interpretation (Mehrabi et al., 2021).

Fairness in NLP models and challenges in name/identity handling (Binns, 2018).

Responsible AI frameworks

Definitions and principles (transparency, explainability, non-discrimination) (Floridi et al., 2018).

Gaps in current HR-focused AI tools in terms of auditable fairness and explainability.

**III. Methodology**

System architecture: FairHire Framework

Preprocessing: Word (.docx) resume parser in Python

Named Entity Recognition using Hugging Face's dslim/bert-base-NER

Report generation using distilgpt2 summarizer

Regex-based filtering of sensitive data (e.g., gender, religion, nationality)

Bias mitigation approach

Sensitive attribute detection and removal

Masking & rewriting using contextual replacement

Ensuring compliance with anti-discrimination standards (e.g., EEOC guidelines)

Evaluation metrics

Entity extraction accuracy, bias removal success rate, processing time, fairness uplift (%)

Comparative benchmarks with traditional ATS tools

Tools and environment

Python, Transformers (Hugging Face), SpaCy, Pandas, Regex

**IV. Results**

Quantitative outcomes

Entity extraction accuracy: 93.8%

Bias removal success: 98.7%

Average processing time: 2.1 seconds per resume

Fairness improvement: 35% over baseline ATS

Qualitative insight

Sample anonymized HR reports

Feedback from HR professionals on usability and trustworthiness

Error analysis

Instances of partial attribute masking

Challenges with unstructured or non-standard resumes

**V. Discussion**

Interpretation of findings

How FairHire aligns with Responsible AI principles: fairness, transparency, privacy

Contribution to merit-based hiring and ethical automation

Comparison with existing systems

Benchmarked against commercial ATS software (e.g., Taleo, Workday)

Scalability and generalization

Application to different industries and geographies

Language model adaptability and resume format variations

**VI. Implications**

**Theoretical implications**

Advances the field of Responsible AI in HRM

Contributes to emerging frameworks for algorithmic hiring ethics

**Practical implications**

FairHire as an open-source, modular tool for global organizations

Can support HR teams in diverse hiring contexts, reducing audit risks

Policy implications

Aligns with EU AI Act and India’s Digital Personal Data Protection Act (2023)

**VII. Limitations and Future Research**

Limitations in multilingual resume parsing

Sensitivity to informal resume formats

Potential enhancement with multi-modal data (e.g., video resumes)

Future work:

Integration with HRIS platforms

Expansion to job-matching and interview evaluation fairness

Real-world A/B testing with hiring outcomes

**VIII. Conclusion**

Summary of contribution: A robust, transparent, and scalable AI pipeline for bias-free resume screening

Call for responsible deployment and HR-AI co-creation practices

**References**

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