Project Proposal: Intelligent Employee Appraisal System

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1. Introduction

This project aims to develop an AI-driven Employee Appraisal System using collaborative filtering and cosine similarity. The goal is to provide fair, unbiased, and data-driven evaluations of employees in a software industry setting. The system aggregates feedback from peers, managers, and self-reviews, and then uses similarity-based weighting to determine final scores and verdicts on promotion and salary appraisals.

2. Objectives

- To design a fair employee appraisal system using Artificial Intelligence techniques.

- To apply collaborative filtering for detecting similarities in review patterns.

- To utilize cosine similarity for generating weighted performance scores.

- To incorporate peer, HOD, and self reviews for multi-source evaluations.

- To provide transparent verdicts with traceable score calculations.

3. Methodology

The system is implemented using Python and uses the following key steps:

- Data Collection: Reviews are gathered for each employee under various performance categories.

- Similarity Calculation: Cosine similarity is applied between peer reviewers and a reference vector to weigh the reliability of reviews.

- Collaborative Filtering: Weighted averages are calculated by filtering out anomalous or inconsistent

reviewers.

- Score Fusion: Objective scores and peer ratings are combined using weighted aggregation.

- Verdict Assignment: Based on final score thresholds, verdicts like 'Promote', 'Needs Improvement', or 'Retain' are assigned.

4. Technologies Used

- Python 3.x

- NumPy (for cosine similarity calculations)

- Tkinter (for GUI)

- Custom modules for similarity analysis and review management

5. Future Enhancements

- Integration of NLP-based bias detection in reviews.

- Database support for persistent employee records and analytics.

- Visualization of appraisal trends using charts and dashboards.

- Role-based access control for secure evaluation processes.

6. Conclusion

This system enhances employee evaluations by minimizing human bias and incorporating reliable AI-driven logic. With a foundation in collaborative filtering and similarity analysis, it ensures scalable, fair, and repeatable performance assessments across organizations.