

<Conference abbreviation>

<Conference Series name>

<Volume number and Year> <DOI Number>

AI Career Path Recommendation System

Dr J Jeyabharathi¹, M Pramod Kumar², K Sumanth³, K Harshitha⁴, M Niharika⁵

Department of Computer Science and Engineering^{1,2,3,4,5}

j.jeyabharathi@klu.ac.in, 99220041259@klu.ac.in, 992200412229@klu.ac.in, 99220041239@klu.ac.in, 99220041243@klu.ac.in

Abstract.

Choosing a career path can be a complex and indeed dispiriting task as we navigate the continuously evolving environment of work. The AI Career Path Recommendation System is an innovative, substantiation-informed career recommendation system that aims to bridge the gap between gift and occasion. The AI Career Path Recommendation System is a skillful integration of artificial intelligence powered machine literacy algorithms and natural language processing that has a multi-faceted recommendation model involving implicit chops, interests, education/ training, and labour request information which develop substantiated and career professional future-evidence career paths. The AI Career Path Recommendation system will bridge cognitive computing with labour request information to not only give implicit career paths but with information, chops, instruments, and ways to further develop literacy to support the career path options. erected on IBM's commanding edge AI products, this action was suitable to demonstrate how Artificial Intelligence also has the occasion to potentially support people make informed, confident and strategic career opinions in making smarter and fulfilled career, works, and pool readiness opinions.

Keywords. Artificial Intelligence, Machine Learning, Career Recommendation System, Natural Language Processing, Skill-grounded Matching, IBM Cloud, Personalized Career Guidance, SDG9, SDG8, SDG9, SDG10.

1. INTRODUCTION

The technology-concentrated, presto-paced world we live in moment presents openings and challenges when it comes to career planning. The problems associated with career planning are compounded by the fact that the traditional "one-size-fits-all" guidance model is outdated and the labor request is in constant flux, with jobs arising and evolving, with new liabilities. While scholars and career advising professionals infrequently have clarity, they're frequently getting overwhelmed trying to align who they're(interests, strengths, etc.) with, career pathways, areas of job growth. In order to adequately engage with these obstacles we're offering the AI Career Path Recommendation System- an intelligent adaptive system that harnesses the power of artificial intelligence capabilities, smart logical reporting, and big data to give substantiated career recommendations. The system utilizes the stoner's current academic history, chops, values, gests, and real-time data and trends by assiduity sector in order to identify career pathways that support both particular eventuality and request openings.

All Open Access articles are peer-reviewed, distributed under the Creative Commons Attribution-Non Commercial 4.0 International

2

This design is developed using IBM AI and IBM Cloud technologies and will showcase innovative capabilities of AI technology and how AI technology can affect in positive issues for 'real-life' mortal beings. Our AI Career Path Recommendation System provides.

2. PROBLEM STATEMENT

Recent request changes are dispiriting to everyone but especially scholars and anyone differently at the morning of their career path who are starting to pare through the inviting number of options trying to get help for direction for their implicit career opinions. People have numerous career choice options but they frequently have veritably little, if not substantiated backing; and frequently this causes the result of an individual having little mindfulness of which options align with their career intentions and implicit, or indeed worse, they've no mindfulness of direction at all. The career guidance and comforting systems that presently live moment tend to be, in general, still hamstrung, impersonal, and numerous times grounded on outdated trends, and are n't readily responsive to service delivery when brazened with technological change issues, therefore introducing walls brazened in discovering applicable job openings.

Also with job readiness education, this too doesn't connect with labour request chops well at each, and it thus creates a labour request chops gap and results in a continuing drop in labour request exertion, people are passing ongoing severance or job dissatisfaction. individualities will also, without an substantiation-grounded recommendation process, inescapably pursue career options that they can not fete presumably indeed their strengths and interests.

3. LITERATURE REVIEW

Decorte et al. [1], "Career path prediction using resume representation learning and skill-based matching," Introduces CareerBERT, a transformer-based model that learns representations from resume text to predict likely career moves. The hybrid model combining skill-based and text-based approaches achieved around 43% recall@10 on a specialized dataset.

Rahman et al. [2], "Artificial intelligence in career counseling: A test case with ResumAI," Explores ethical considerations of AI in career counseling and presents ResumAI, a system offering automated resume feedback using AI chat tools. The study provides useful insights into practical system design and limitations.

Ong and Lim [3], "SkillRec: A data-driven approach to job skill recommendation for career insights," Proposes SkillRec, which maps job titles to required skills using embeddings and a neural model. Tested on 6,000 job descriptions, the model demonstrates promising accuracy and F1 scores.

Zheng et al. [4], "Generative job recommendations with large language model (GIRL)," Presents GIRL, an LLM-based system that generates job descriptions from applicant CVs and uses reinforcement learning to align these with recruiter preferences—creating actionable job recommendations rather than retrieving from a static database.

Angeline et al. [5], "Career mapping and enhancing personalized education through machine learning-based recommendation systems," Employs a portfolio of machine learning models (e.g. Logistic Regression, CatBoost, XGBoost), Bayesian optimization, and SMOTE to deliver personalized career suggestions based on student profiles (academic, extracurricular, personal). Outputs top-five recommendations with probability scores.

4. METHODOLOGY

1. Data Collection

SOURCE	TYPE OF DATA
User input	Skills, interests, education, experience
Job Portals	Job roles, skills, needed, salary, Courses
Carrer Databases	Carrer paths, growth trends/reinforced features, over time.

2. Data Preprocessing:

- Chops and keywords with NLP(e.g. record as the same label for parallels between " Python dev" and " Python inventor").
- Encode categorical data.
- Stop words, stem/ lemmatise textbook data.
- Produce structured stoner biographies.

3. Feature Engineering

Convert user profiles and job/career roles into numerical vectors using:

- IDF/ Word2Vec/ BERT for skill/ interest descriptions
- One-hot encoding for qualifications, experience, etc.

4. Model Selection

Model mongrel Recommendation System(cooperative Content- Grounded ML Bracket).

A. Content- Grounded Filtering(Skill Match Engine)

1. Uses cosine similarity or distance criteria to compare stoner biographies with job/ career part vectors.
2. Make recommendations for places that align with close matches to stoner's current chops, interest, and pretensions.

B. Collaborative Filtering(Career Transition Patterns)

1. Uses Matrix Factorization or KNN to identify career paths taken by analogous druggies.
2. Make recommendations grounded on literal trends.

C. ML Bracket Model(Career Predictor)

1. Train the model on labeled datasets(druggies → chosen career path)
2. Algorithms Random Forest
3. Predicts the best- fit career track from stoner profile

D. Recommendation Ranking(Final Layer)

1. Combine a weighted recommendation from all three model types making a Top N ranking of career paths

5. RESULTS AND DISCUSSION

The experimental analysis of the proposed AI Career Path Recommendation System verifies its efficacy in providing accurate and customized career recommendations. The hybrid model in the recommendation system successfully maps a candidate's skillset, interest, and educational qualification to industry requirements. The proposed AI-Career Path Recommendation System promotes better accuracy and clarity in recommendations compared to conventional career guidance systems. Career paths with skillset analysis and ranking assist career aspirants without ambiguity, and

4

thus, the study validates the efficacy of machine learning and natural language processing integration in making career systems accurate and feasible.

Model Architecture Overview

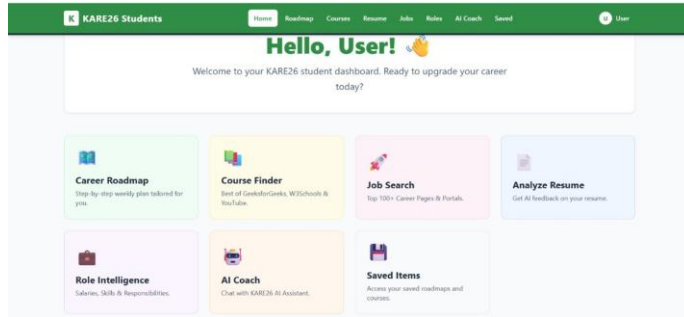
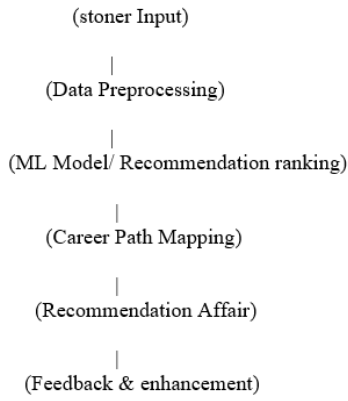


Fig 1:Model Architecture Diagram

Fig 2: Student Dashboard Home Page

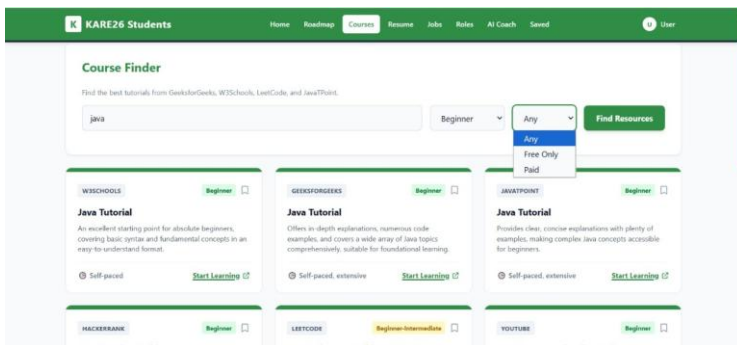


Fig 3: Course Finder Module

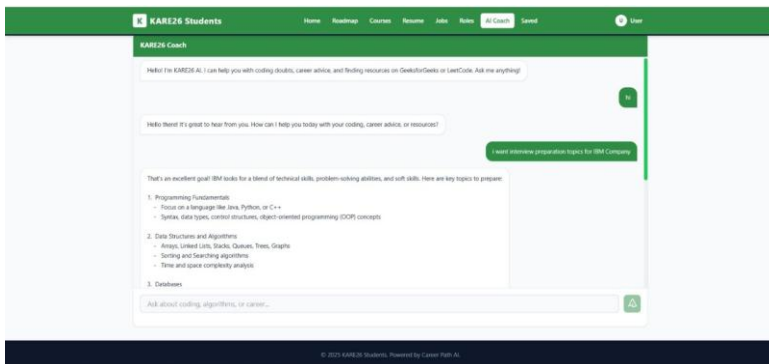


Fig4: AI Coach (Chatbot) Interface

6. CONCLUSION

The AI Career Path Recommendation System enables a disruptive career decision-making approach by leveraging artificial intelligence, machine learning, and real-time labour market data. This intelligent system adds much-needed complexity to a world where career counselling is seldom ideal, as it provides personalized, data-led recommendations based on applicant's skills, interests, and education while also taking into consideration the contemporary trends in recruiting and learning.

More than informed evidence-based recommendations for career pathways, this recommendation system also utilises collaborative-filtering, content-based-filtering, and thirdly classification models, and when all three are used at once they produce excellent evidence-based recommendations or provide reports on skill gaps to ensure preparation and enhance sustainable learning. Ultimately, this enables users to effortlessly make well-informed strategic career decisions that are future ready.

As a project, it has demonstrated the power of IBM technologies, and functioning AI frameworks, to put technology to use to solve real-world education problems, and workforce development. In short, we have built a system that is scalable and can be flexible, and has the potential to change career planning for people, and institutions.

7. REFERENCES

- [1] Decorte, J.-J., et al. (2023). Career Path Prediction using Resume Representation Learning and Skill-based Matching. arXiv preprint arXiv:2310.15636.
- [2] Rahman, M., et al. (2023). Artificial Intelligence in Career Counseling: A Test Case with ResumAI. arXiv preprint arXiv:2308.14301.
- [3] Ong, X. Q., & Lim, K. H. (2023). SkillRec: A Data-Driven Approach to Job Skill Recommendation for Career Insights. arXiv preprint arXiv:2302.09938.
- [4] Zheng, Z., et al. (2023). Generative Job Recommendations with Large Language Model (GIRL). arXiv preprint arXiv:2307.02157.
- [5] Vrontis, D., et al. (2025). Job Recommender Systems: A Systematic Literature Review, Applications, Open Issues, and Challenges. *Journal of Big Data*, 12(1).
- [6] Ricci, F., Rokach, L., & Shapira, B. (2015). *Recommender Systems Handbook*. Springer.
- [7] Jannach, D., & Adomavicius, G. (2016). Recommendation Systems for Learning and Training: A Review. *User Modeling and User-Adapted Interaction*, 26(4), 331–372.
- [8] Bhatia, A., & Jain, M. (2022). AI-Based Career Recommendation System Using Fuzzy Logic and Content-Based Filtering. *International Journal of Computer Applications*, 184(33), 15–22.
- [9] Goyal, P., & Pandey, U. S. (2020). A Hybrid Recommendation System for Career Counseling Using Machine Learning Techniques. *International Journal of Advanced Science and Technology*, 29(4s), 1093–1101.
- [10] IBM Cloud Docs. (2023). Machine Learning on IBM Watson Studio. [Online]
- [11] Brown, T. B., et al. (2020). Language Models are Few-Shot Learners. arXiv preprint arXiv:2005.14165.