IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 1, February 2024

A Literature Survey on AI Driven Career Path Prediction

Shreyas R[1], Praveen C[2], Shreyas S[3], Prof Dr. Kiran Y C[4]
Department of Information Science and Engineering,
Global Academy of Technology, Bengaluru , Karnataka, India

Abstract: *The field of career path prediction and professional planning has seen a significant change due to the growing convergence of AI and computational intelligence. This overview of the literature delves into the latest developments in AI-powered career path prediction, combining research results from several fields. Predictive models and approaches applied to scientists, IT professionals, MBAs, students, and individuals in a variety of industries are examined in this study.*

The study begins with an analysis of how mixed job expectations affect IT professionals' career satisfaction, emphasizing the careful balance that must be struck between administrative and technical tasks. The gender gap in MBA career trajectories is discussed in the following sections, with a focus on wage distribution, promotions, and patterns of mobility. After that, the review turns its attention to long-term career projections and presents cutting-edge models like NAOMI, Fortune Teller, and CareerBERT

Keywords: AI-powered career path prediction, XGBoost and Decision Trees, Cutting-edge models, IT career routes and challenges, Researcher relocation forecasts

I. INTRODUCTION

The field of study pertaining to the convergence of artificial intelligence (AI) and career path prediction has experienced significant growth in recent years, bringing about a change in the way people plan and manage their career paths. The combination of AI technology with a wide range of datasets—from academic achievement and resume representations to social networks and scientific profiles—has opened the door for creative methods of predicting future career pathways. The goal of this review paper is to present a thorough summary of the most recent developments in AI-driven career path prediction. A broad range of applications are covered by the literature review, such as forecasting the career paths of IT specialists, MBA candidates in their early years, scientists, students, and people in other industries. Every segment explores different approaches, models, and datasets, illuminating the special difficulties and insights provided by the corresponding research. This review paper essentially provides a comprehensive examination of AI-driven career path prediction, providing an understanding of the various approaches, datasets, and applications that influence this dynamic field. A comprehensive picture of the present and potential future orientations of AI-driven methods for predicting and navigating career paths is offered by the integration of research data from several studies.

II. LITERATURE SURVEY

Hong Quan Nguyen et Al.,[1] as proposed, emphasizes the need to go beyond grades as it examines the complexities of projecting students' career choices based on academic performance. It promotes comprehensive studies of individual traits and a wide range of data gathering methods to guarantee objective forecasts. It suggests that the XGBoost Decision Tree model is essential and emphasizes how effective it is in providing precise insights into career choices. The essay emphasizes how important machine learning is to solving the problems with career prediction faced by college students. It describes how Decision Tree Classification is used, with particular reference to models such as C5.0, CHAID, and CART. The paper demonstrates how well the XGBoost algorithm predicts future career pathways based on academic, behavioral, and job choice characteristics by evaluating data from Computer Science graduates. Furthermore Charlotte James et Al,.[2] as proposed, data mining techniques to predict changes in researchers' institutions by defining a scientist's profile based on their recent career history, the quality of their scientific environment, and the structure of their collaboration network. According to a researcher's scientific profile, their two-

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stage predictive methodology first uses data mining to forecast where the researcher will go in a year. The selected institution is then predicted by a fresh social-gravity model that incorporates elements from the first step. Benefits include much improved accuracy—up to 85% better than current approaches—and deep insights into the factors that influence relocation, with a focus on social interactions. The approach can be applied to a wide range of highly talented persons; nevertheless, there may be certain drawbacks, including data accessibility and ethical issues.

Damien Joseph et Al,.[3] as proposed, Three primary job routes are identified by the research, which explores career paths in the IT workforce: careers in information technology (IT), professional labor markets (PLM), and secondary labor markets (SLM). It highlights the impact of concentrating in IT-related degrees on career persistence and exposes the intricacy of the various career pathways taken by IT professionals. While variance analyses, cluster analyses, and optimal matching provide computational complexity as a hurdle, they also provide benefits like quantitative similarity metrics and insights into objective career success. Research gaps include a lack of knowledge about the long-term effects of low entry barriers, the influence of individual profiles on career evolution, and career diversity. The need of taking individual characteristics into account for efficient IT career planning, mobility between occupations, and a variety of career routes are highlighted as key lessons. Also Jens-JorisDecorte et Al,.[4] as proposed, the necessity for resume-job pairings, the study presents CareerBERT, a revolutionary approach for learning expressive representations of textual career histories. CareerBERT investigates various training strategies using a small, anonymous dataset enhanced with structured occupation labels; CareerBERT-ALL performs best for industry categorization and career path prediction. The study's output includes text- and skill-based models that highlight the importance of foundational skills and how they relate to the demands of the workforce going forward. Predictive accuracy is increased when text and skill-based forecasts are used together. The study's conclusions about internal job mobility and preventing turnover draw attention to the possibility of using resume text to evaluate career advancement in the absence of large datasets.

Ye Liu et Al,.[5] as proposed, The Multi-Source Learning with Fused Lasso (MSLFL) model outperformed the Support Vector Machine (SVM) and Regularized Least Square (RLS) baselines in the study's evaluation of models for predicting career growth. MSLFL showed expertise in recognizing temporal patterns in career development by utilizing heterogeneous information from social media, highlighting the dynamic character of professional routes. The model finds important factors, guarantees consistent forecasts over time, and integrates data from multiple sources. Although MSLFL has benefits like temporal modeling and full source fusion, complexity and performance issues could arise. This research fills a vacuum in the field of multi-source learning for career path modeling by capturing dynamic progressions and elegantly merging heterogeneous information. Furthermore Liangyue Li et Al,.[6] as proposed, The way that NEMO handles high-dimensional categorical features in member profiles creates opportunities for more study and model improvement. Developing attention networks within NEMO for more interpretable predictions, investigating the influence of social connections on career trajectories, adding dynamic attributes to reflect skill evolution, and incorporating external context such as economic trends are some potential implications. Efforts could also improve NEMO's generalizability across various locations and job marketplaces. In future study and development, these directions point to prospective directions for enhancing NEMO's predictive skills and guaranteeing its applicability in a variety of professional scenarios.

QingxinMeng et Al,.[7] as proposed, In order to forecast job mobility, the paper presents a Hierarchical Career-Path-Aware Neural Network (HCPNN) that uses an integrated attention mechanism and integrates personal profiles. Improved accuracy, interpretability, and patterns related to employment duration and firm type are all provided by the model. Gaps such the requirement for knowledge at the individual level, the necessity for specificity in prediction issues, the handling of complicated data structures, the resolution of sequential and long-distance relationships, and the achievement of model interpretability are all addressed. By forecasting candidate

acceptance likelihood and estimating possible duration of stay, the HCPNN enhances recruiting, lowers attrition rates, supports internal promotions, and aids in decision-making processes—all of which contribute to talent management. Also V Madhan Mohan Reddy[8]as proposed, the difficulties students encounter when selecting appropriate career pathways. The importance of making educated decisions to steer clear of potential hazards is emphasized throughout the document. The suggested system makes use of machine learning, more precisely the Decision Tree Algorithm, to forecast the best vocations for engineering graduates based on a variety of factors, such as hobbies and programming abilities. With more than 30,000 records in the training dataset, the system creates precise career roadmaps that direct

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students toward pertinent coursework and assignments. The system strives to help students make informed career decisions that are in line with their interests and talents, despite possible obstacles. Furthermore N. VidyaShreeram et Al,.[9] as proposed, Current prediction models are limited by factors such as the time and expense implications of using certain machine learning methods, such as Adaboost, which require more resources even though they provide higher levels of accuracy. Furthermore, the Ada-GA approach, which combines Adaboost and genetic methods, efficiently determines student risk but has difficulties when handling large datasets.Enhancement opportunities include reducing the time and cost constraints related to certain machine learning principles, coming up with methods for managing big student datasets, and improving prediction model accuracy. There is also room for improvement when it comes to predicting the career paths of students by investigating novel approaches or alternative machine learning techniques. Also ShivakotiUdayasri et Al,.[10] as proposed, Professional and personal development of students are greatly impacted by their career decisions, which also affect their job happiness and financial security. Nevertheless, pupils frequently lack sufficient direction and rely on personal recommendations from family and friends. Our research uses information on students' abilities, hobbies, and academic achievement to create a recommender system based on their choices in order to solve this. We determine the most efficient model for precise career suggestions by contrasting different methods, such as SVM and Decision Trees. This system could be very helpful to students in matching their goals with appropriate job pathways. For more individualized coaching, future improvements might incorporate cutting-edge technologies and job exploration tools. Furthermore Lillian t. Ebyet Al,.[11] as proposed, Three major kinds of characteristics, referred to as professional competences, were found when success predictors in boundaryless occupations were examined: "knowing why," "knowing whom," and "knowing how." The perception of professional success, as well as one's own and external marketability, are strongly influenced by these qualities. Notably, "knowing why" was found to be especially important. In order to succeed in one's work, the study stressed the importance of being open to trying new things, making opportunities for yourself, and setting reasonable goals. Moreover, it emphasized the diverse significance of these proficiencies for various achievement standards. The study hinted at possible gender-based variations in success predictors and emphasized the need for more investigation into gender's role in boundaryless careers. All things considered, the study provides empirical support, shedding light on the complex abilities necessary for success in the fast-paced corporate environment of today. Also Michiharu Yamashita et Al,.[12] as proposed, The paper presents a novel method for predicting future career trajectories: the NAOMI model. By utilizing multi-view embeddings, task length weight masking, and neural collaborative reasoning, NAOMI outperforms both state-of-the-art benchmarks and traditional machine learning models, with notable success in longer prediction intervals. Specifically, NAOMI shows significant advantage over other approaches at step sizes of 3, 4, and 5 in job title pathway prediction. Its effectiveness also surpasses all benchmarks in terms of company pathway prediction at all step sizes. All things considered, the study validates NAOMI's ability to anticipate future career paths, especially demonstrating its superiority in longer-range forecasts. Furthermore Maria L. Kraimeret Al,.[13] as proposed, The study finds a favorable correlation between employees' views of organizational support and formal developmental activities and relationships. Organizations should focus formal developmental programs and cultivate strong ties with senior management in order to improve this assistance.Career Opportunities' Moderating Role: The relationship between employee performance and turnover and organizational support for development is significantly influenced by perceptions of career opportunities. The study emphasizes how the impact of development support on employee outcomes is largely shaped by projected career prospects.Employee Performance and Turnover: Research shows that job performance and organizational support for development are positively correlated, particularly when workers believe their careers are well-developed. Also Taylor H. Cox et Al,.[14] as proposed, having comparable education, age, experience, performance, and career pathways to men, the study on gender-based inequalities among MBAs found that women saw fewer management promotions, lower wage increases, and lower hierarchical levels. The study used multiple regression analysis to determine how firm seniority, starting pay, job levels, mobility, line experience, and mobility affected career success metrics. The study highlighted the need of removing obstacles associated with gender in the workplace and indicated that career paths should be better defined. The research emphasized the need of examining the quality of experiences inside job positions among MBA professionals in order to better understand gender-based differences in career success, notwithstanding difficulties in understanding gender-success linkages. Furthermore James J. Jiang et Al,.[15] as proposed, The report emphasizes the influence of management and technical

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responsibilities while highlighting the changing career dynamics for senior IT workers. Both factors have an impact on career satisfaction in this area, which peaks at the highest levels of managerial expectations. It's interesting to note that jobs combining technical and managerial abilities are preferred secondarily. Interestingly, a U-shaped association appears, suggesting reduced pleasure in the cases of either excessive or insufficient competency. Thus, striking a balance between managerial and technological expectations will result in optimal satisfaction. These results illuminate the complex structure of modern career aspirations in the area and have important ramifications for the satisfaction and course of IT professionals' careers.

III. CONCLUSION

A thorough review of the literature is conducted to investigate AI-powered career path prediction in a variety of fields. It highlights how career planning is changing and makes use of artificial intelligence and computational intelligence. Predictive models utilizing cutting-edge techniques like XGBoost and Decision Trees as well as ground-breaking models like NAOMI and CareerBERT are covered in the review for use by IT professionals, MBAs, scientists, and students. With regard to obstacles in IT career routes, researcher relocation forecasts, and cutting-edge techniques like HCPNN and Decision Tree Algorithm for engineering students, the study highlights how AI has the capacity to revolutionize the matching of people with appropriate career paths. To empower people in their career journeys, it asks for improving forecasting accuracy, conquering data obstacles, and improving career definitions..

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