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AI-Powered Career Enhancement Portal: A Comprehensive Survey on Intelligent Career Guidance Systems Using NLP and Generative AI

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Abstract: ***Competition and the use of technology are some of the major elements that have significantly impacted career planning.Theconventional careerguidanceprograms areseento be unable to provide personalized solutions to individuals. This paper provides a detailed review of different Artificial Intelligence-based career enhancement systems using techniques like Natural Language Processing, Machine Learning, and GenerativeAI.Thispaperdiscussesvariousissuessuchasresume analysis, AI-powered interview simulations, career pathway formulation,andcoverletterwriting.Thispaperanalyzesboththe pros and cons of implementing such intelligent solutions. In addition, a combined AI-based career enhancement portal solutionisintroducedthatcombinesalloftheseintelligentsystems in one platform. This will have a major impact on career development.***

Index Terms: ***Artificial Intelligence, Natural Language Processing,MachineLearning,ResumeAnalysis,MockInterview, Career Enhancement, Generative AI, SBERT***

I. INTRODUCTION

Moving from studies to profession is becoming more and more challenging owing to the drastic technological advancements and dynamic requirements of the industrial sector. It is not enough for the people looking for jobs to be technically skilled; they need to be communicative, problem solvers, and flexible.

Counseling, training, and job placement systems are not customized according to individual needs. Such systems are static.Thegeneralinformation provided bysuch systems does not cater to the dynamic requirements of the job market.

With the emergence of Artificial Intelligence (AI), sig- nificantimprovementshavebeenobservedinautomation, personalization, and scalability of career support systems. AI- based systems can analyze large volumes of data, identify patterns, and generate intelligent recommendations.

Inparticular, NLPandLLMshaveallowedhumanlanguage to be understood and generated by these tools, hence, their immense application within career-oriented uses.

Even though there have been such advancements within AI technology,mostofthesoftwarecreatedsofarcaterstospecific uses such as resume building or job interview preparation [2], [5], [11]. The need exists for an all-in-one solution that can bring together various functions within a common platform. This study discusses the thorough analysis of available career systems based on AI technology.

II. LITERATURE SURVEY

A. AI-BasedMockInterviewSystems

The general idea regarding the application of artificial intelligence for mock interview training involves the creation of realistic interview cases with the use of highly advanced Natural Language Processing (NLP) and Machine Learning (ML). For instance, Mishra et al. [2] suggested implementing the GPT-based mock interview design framework that evaluates answers based on accuracy, self-confidence, and communication ability.

The most recent innovations in the domain of machine learning and NLP allowed the introduction of voice-based communicationintothemockinterviewframework.According to Naing et al. [9], the development and implementation of interview cases can be achieved through such technological means as ASR and TTS.

However, most of these systems lack integration with other career development modules and often operate as standalone solutions.Thesesystemssignificantlyimproveinterviewreadi- ness but lack integration with other modules [3], [4].

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B. ResumeAnalysis Systems

Resume screening systems have been extensively used in recruitment processes in order to enhance the efficiency of resume screening.

Resume screening systems leverage NLP techniques like tokenization, POS tagging, and entity recognition.

Julian et al. [5] suggested the use of an NLP-based system that would classify resumes through machine learning. Prashanth et al. [6] suggested building an NLP-based system forresumescreeningbyusingtheWord2Vecalgorithmandthe cosine similarity method.

Thereareseveraladvancedresumescreeningtechniquesthat includeSentenceBERTthatimproves theunderstandingofthe resume. But at the same time, these systems heavily rely on keywords and do not provide any career guidance.

One of the ways in which NLP can be used in resume screeningincludesusingmachinelearningforscoringpurposes [7][8].

C. CareerRoadmap Generation

Career pathway planning system employs AI technology in giving recommendations for career paths of individuals. The pathways recommended by the system are in addition to the technological tools needed.

ACareerPathwayPlanningSystembasedon AITechnology has been introduced by Naing et al. [9]. The proposed system can be employed for providing guidance on career steps. The proposedsystemisdynamicinnaturebecauseitsfunctioningis determined by user inputs.

Themaximumpotentialofthesystemisnotexploitedasit does not include tools for preparation of interviews and resumes.ModerndaysystemsemploybothAIandadaptive learning models [10], [12].

D. AutomatedCoverLetterGeneration

Theprocessofdocumentcreationhasbeen greatlyenhanced by generative AI. According to Kavitha et al., [13], there is a suggestion of developing a system for the generation of personalized cover letters through language models.

The development of this system helps create professional documents from analysis of job descriptions and candidates' profiles. However, this system has not been incorporated into other career modules.

E. Integrated CareerGuidanceSystems

Current research has taken an interest in bringing different career services under one roof. Such a service will consist of resume analysis, interview preparation, and job advice.

There are still some issues in the current integrated career service such as scalability, real-time feedback, and personalization. Current career services lack advanced capabilities of AI such as semantics and voice commands.

F. Feedback,Explainability,andRecommendationLayers

The better a career system becomes in terms of explainability, the more successful its recommendations become.Explainabilityplaysakeyroleasausershouldbeable to have confidence in recommendations provided by a particular career system and understand how to improve their profile and skills accordingly. Sankalp, together with other similar career systems, shows the strength of using the hybrid architecture to create explainable career system recommendations. Sankalp uses semanticmatching, sentiment analysis,andrule-basedlogictoprovideeffectivecareersystem recommendations [12].

The system leverages SBERT-based semantic similarity, VADERsentimentanalysis,knowledgegraphs,andrule-based logictoprovideanexplainablerecommendationofthesystem's performance. In addition,thesystemmakesuseofvoice-based interactions in several languages and adaptive learning to improve recommendations through user feedback [12].

The most successful career systems are those that use all threemethods. Fromthesurveystandpoint,thefollowingthree main types of AI-based feedback exist:

- Rule-basedfeedback:Thistypeoffeedbackisbasedon deterministicsuggestionsbasedontheabsenceofcertainskills, weak sections, or certain criteria.
- Semantic feedback: This type of feedback is based on embedding similarity models.
- LLM-based feedback: This type of feedback is based on natural language explanations and summaries.

Thisisespeciallyusefulinacademicandreal-worldsystems where scoring and interpretability are both important.

Career guidance solutions based on Artificial Intelligence have undergone substantial improvement through the incorporation of several other technologies including Natural Language Processing (NLP), Machine Learning (ML), and Generative AI.

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Recent research focuses on the adoption of combined methods that leverage these techniques to enhance the efficiency of such solutions [9], [12].

TheintroductionofTransformerarchitecturemodelssuchas BERTandSBERThasledtoenhancedsemanticunderstanding for resume and job match systems. Such models make use of the context relationship of the words to perform the matching process effectivelyasopposed to conventional keyword-based techniques [5], [6].

Onemajor trend thathasemergedthrough thereadingofthe current literature is that of adaptability and feedback-based career guidance systems. Some advanced solutions including Sankalparebasedonreinforcementlearningandfeedbackfrom users [12].

III. COMPARATIVE ANALYSIS

The comparative analysis of the current career guidance systems usingartificial intelligenceisneeded toevaluatetheir effectiveness, adaptability,andusability.ThestudyshowsthatthecurrentAI-based career guidance systems are created for dealing with particular problems such as resume analysis, preparing for interviews, and career guidance. Nevertheless, their effectiveness depends on the methods used within the system.

The methodsusedin AI-based mockinterviewsystemsarelarge language models (LLM) and NLP. The first benefit of using this system is to improve communication skills and boost confidence. The limitation of this system is the incapability of understanding contexts and analyzing the performance. Another disadvantage of this system is that it is not customized according to resume-based criteria.

Theresume analysissystemusesseveral NLPmethodssuchasTF- IDF, Word2Vec, and SBERT. This system was highly efficient in recruitment. The limitation of this system is that it is only capable of matching keywords. Another system that utilizes SBERT technology was highly efficient in contextualizing. The limitation of this system is that it requires a lot of computational power.

The career guidance system utilizes machine learning and recommendation technologies. These technologies are helpful in recognizing the gaps in skills and providing a learning path. However, the system lacks flexibilityand the capabilityto adapt to the latest industry trends and user responses.

The automated cover letter writing system utilizes Gener- ative AItechnology. This technologyhastheadvantageof creating professional cover letters. However, the system lacks personalization in the context and tone of the cover letter.

Theintegratedsystemattemptstointegrateallthecomponents in a single system. However, the existing systems in the field face many challenges, such as scalability, the absence of real-time feedback, andtheabsenceofexplainability. Thesesystemsalsofail to provide a seamless user experience because the modules in the system interact poorly.

The existing systems also fail to provide the necessary evaluation metrics to compare the system's effectiveness. For instance,thesystem'saccuracy,usersatisfaction,responsetime,and flexibility are not taken into account while creating the system.

The above challenges show the need to design an integrated systemwhichisscalableandintelligentinnature. Thesystemmust be able to provide personalization, real-time feedback, and explainability [1], [5], [11].

TableIshowsthecomparisonofvarioussystemsinterms oftechniques,features,andlimitations.

TABLEICOMPARISONOFEXISTINGSYSTEMS

System	Technique	Features	Limitations
MockInterview	LLM	DynamicQ/A	Nointegration
ResumeAnalyzer	NLP	SkillMatching	Limitedcontext
CareerSystems	ML	Recommendations	Staticoutput
CoverLetter	GenAI	Automation	Standalone
IntegratedSystems	HybridAI	Multi-module	Limitedscalability

From the comparison, it is evident thatmost systemslackaunified architectureand fail to provide end-to-end career support.

Resumeanalysistoolsenhancerecruitingeffectivenessbut are constrained by keyword search and inflexibility to adjust to evolving job descriptions [7], [8].

Careeradvisingservicesoffersystematicadvicebutdonot account for current job market dynamics, thus offering static career advice [11]. Generative AI-based cover letter generators automatecover letter creation but lack context without linkingto user profiles [13].

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IV. RESEARCH GAP

On the basis of literature surveyand comparative analysis, it has been identified that there are several critical gaps in the existing AI-based career guidance systems.

Firstly, thereis a lack ofintegrated systems that can perform resumeanalysis,interviewpreparation,careerroadmapcreation, anddocumentcreation.Theexistingsystemsworkinanisolated manner, which is creating difficulties for users.

Secondly, another significant problem of career guidance systems is that of personalization. Current career guidance systems give generaladvicetousers without beingabletoadapt their services according to each individual's profile, learning style,andcareerobjectives.Lackofanadaptivelearningprocess is causing difficulties for users.

Thirdly, the feedback process offered by the career guidance systems is not an effective one. Several systems offer feedback after a delay period.

Continuousfeedbackanditerativelearningareessentialforskill development but are rarely implemented.

The next major area where there is a gap in the application ofAIin naturallanguageprocessingisthelack ofapplication of semantic understanding. Although there has been some improvementintheapplication ofSBERTandembeddings,itis still in its early stages.

Explainability is another area where there is a major gap in the application of AI in natural language processing. Many AI systems are still in a black box state, meaning they give recommendations without being able to explain them. Systems like Sankalp[12] have tried to address this issue, but it is still in its early stages.

In addition to that, the development of voice-based or interactivesystemsisstillintheearlystages.Themajorityofthe systemsarebasedontext-basedinterfaces.Asaresult,thelevel of realism in the simulation of the interview process is compromised.

Theissueofscalabilityisanothersignificant probleminthe development of AI-based systems. Themajorityof thesystems lacktherequired efficiencyin thehandlingoflargedataorreal- timeprocessing.

Last but not least, the lack of standardized evaluation systems is one oftheproblems in thedevelopment ofAI-based systems. The majority of the systems are evaluated using isolated metrics. Theabove problems clearlyshowtheneed for an integrated, explainable, and adaptive AI-based system for career enhancement [1].

Besides the gaps mentioned above, there is no mechanism for learning in current systems. Most existing systems fail to update their recommendations depending on how the users interact with them, which limits their capacity to provide adaptive career recommendations [12].

A further major gap lies in real-time integration with job markets. This means that many current systems use static data sets, which produces less accurate recommendations [9].

Moreover, interdisciplinary approach is barely used. Integration of AI with psychology can greatly enhance the quality of career advice.

Finally, there is no standardized framework for evaluating different systems. Themost common criteria usedareresponse time and accuracy.

V. CHALLENGES IN EXISTING SYSTEMS

As mentioned in the literature review section, thefollowing limitations were faced in the existing AI-based career guidance systems:

- LackofIntegration:Theexistingsystemswerefragmented and were more focused on specific components such as resume analysis [5], mockinterviews [2] etc. .
- Limited Personalization: The existing systems were not able to provide personalization and were more generic in nature.
- Keyword-BasedProcessing:Theexistingsystems werenot able to understand the contextual and semantic meaning of the text.
- Lackof Explainability:Theexistingsystemswerenotable to explain the feedback provided.
- No Real-Time Feedback: The existing systems were not able to provide real-time feedback.
- Scalability problems: The current systems lacked the capability to handle large data volumes. Manysystems lack the capacity to handle huge data volumes or large numbers of simultaneous users.
- Limited interaction: The current systems lacked the capability to offer voice functionality. This means that interactions take place in text form with limited voice functionality.

VI. FUTURE SCOPE

Furtherimprovementinthedesignofthesuggestedsystemcan be made as:

- Integration of different job portals such as LinkedIn and Naukri in real-time for purposes of matching:

This will ensure that the jobs available in theseportalscan be accessed instantly and recommendations can be made according to the demand in the market.

- Use of emotion detection through facial expressions or voice recognition technology:

The addition of this technology will allow the analysis of candidate confidence in mock interviews.

- Construction ofAI-based analytical dashboards for analyzing user performance:

AI-driven dashboards can provide useful insight into the performance of the user by highlighting his/her weaknesses and strengths.

- Analysis of job market trends in real-time through the use of big data and web scraping technology:

Big data and web scraping can be used for analysis of large volumes of data to forecast future trends in the job market.

- Offeringamultilingualinterfaceforattractingglobalusers:

Thiswillallowthesystemtocatertoaninternationalcustomer base.

- Reinforcement learning algorithm for recommendation purposes:

Theimplementationofthislearningalgorithmcanenhance the efficiency of recommendation techniques adopted by the system.

- Hostingofthesystemon cloudplatforms:

Hostingofthesystemoncloudplatformsoffersseveral benefits for optimizing system performance.

- Combinationofallintelligentmodulesintoonecareer preparation platform:

Havingallthemodulesintegratedintooneplatformmeans that the user experience will be seamless and more effective.

VII. CONCLUSION

The objective of this paper is to present a survey of career enhancement portals using Artificial Intelligence. This survey will particularly focus on its individual components such as Resume Analysis, Mock Interview, Career Roadmap Development, and Cover Letter Development. This study demonstrates how Artificial Intelligence, Natural Language Processing, and Generative AI technologies have been highly useful in enhancing the various aspects of Career Enhancement Processes.

ManyCareerEnhancementSystemscontainuniqueand stand-alone features that have led to their inability to provide personalized solutions tothe users ofthe system. Moreover, there have been issues like a lack of semantic understanding and explainability that have reduced the effectiveness of Career Enhancement Systems.

To address the abovementioned challenges, an AI- based career enhancement portal will be discussed that utilizes several modules in an integrated manner.

Overall, the integration of AI-based systems can make career preparation more effective.

The survey demonstrates the importance of the introduction of state-of-the-art technologies such as Artificial Intelligence, Natural LanguageProcessing, and Generative AI, which make career preparation more efficient, accessible, and personalized.

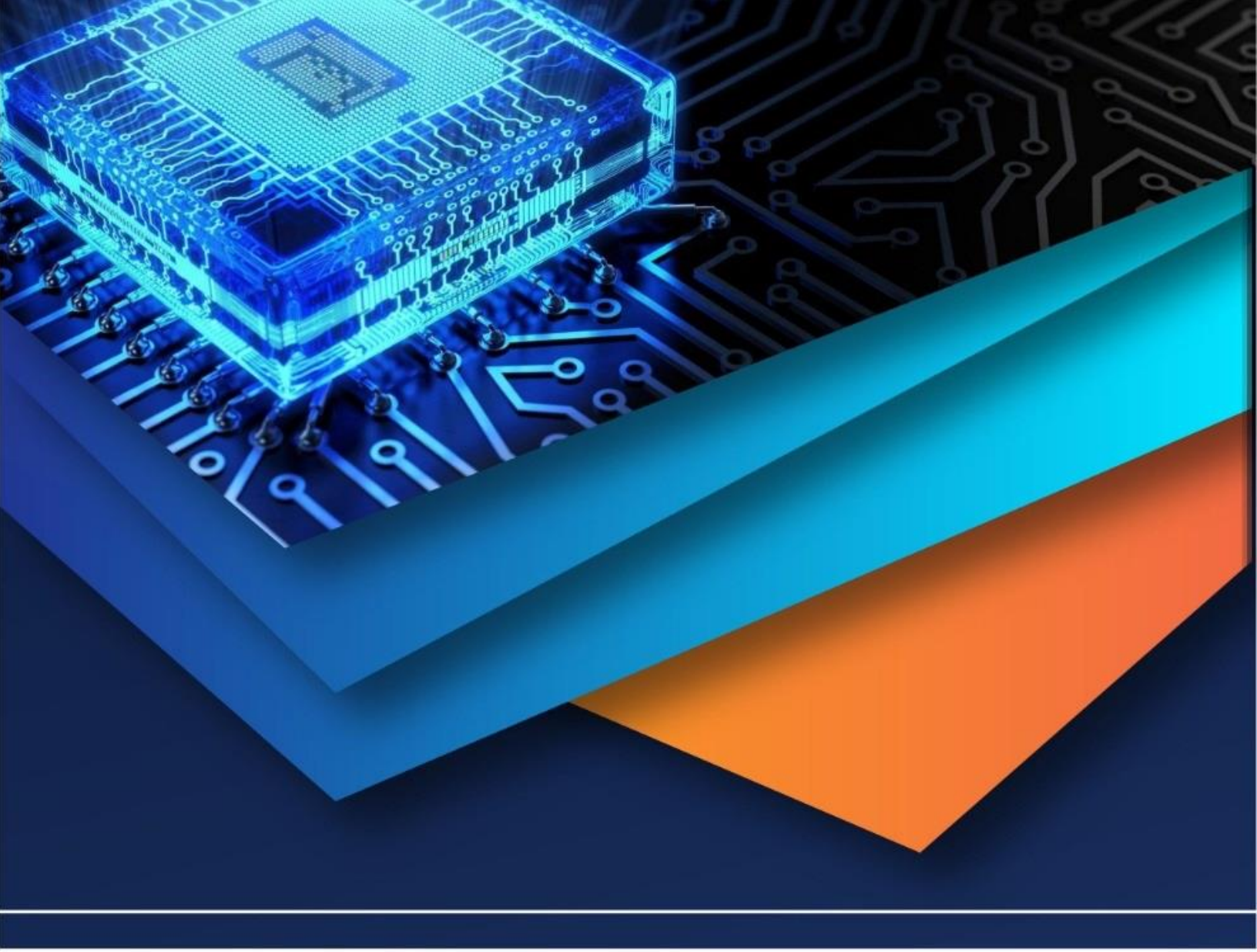
Based on the assessment of current solutions, it can be concluded that despite the fact that there are several innovationsinplace,allofthesystemsfunctionseparately from each other. It leads to a decrease in personalization and inefficiency of use. Moreover, several problems, including a lack of semantic understanding, contextual awareness, and explainabilityof AI-based decisions, still remain relevant. Furthermore, the implementation of advanced NLP tools and Generative AI models can help increase the ability of the system to provide more personalized responses by better interpreting the user requests.

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