

Rehashing State of Art Artificial Intelligence Centered Career Counselling Platforms

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Abstract

Significant impact due to the rapid computerization and digitization in workplaces have changed the nature of career counselling, choices and development processes. With the ever-changing occupational market, increased number of individuals are facing challenges to acquaintance with the imminent occupations and industries. Significant assistance is offered by career experts to enable people infer, acquire and appraise from these advancements while facilitating in career planning and selection. In India, the career counselling and guidance sector is still in its earliest stages which are based on futile and inept manual approach. Automation of career counselling and guidance process with aid of intelligent computer solutions have substantial potential while being of larger prominence. Besides, simplification of task and saving time as well as energy, diverse group of populations can be engaged and reached with support of automated solution. Numerous, State-of-Art Artificial Intelligence (AI) based schemes present in the field of career counselling and guidance have been assessed in this paper. Each scheme has been single handedly pondered while emphasizing the loopholes. Finally, the paper concludes by pointing out the challenges and open issues that need to be deliberated.

Keywords: Expert System, Career Counselling, Artificial Neural Networks, Career Guidance, Artificial Intelligence.

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INTRODUCTION

Currently, youth are confronted by a number of factors which govern selection of career [1]. Career selection has emerged as a much complex science, owing to a wide range of aspects which guide choice of career path [2]. With thousands of career options available, the decision for selecting a particular career path turns out to be a daunting, time consuming and complicated task. Selecting an appropriate career is of vital importance in an individuals' life due to its lasting impact on their financial, social and mental well-being [3], [4]. Thus, selection of career path should be done with utmost care while being conversant of all the crucial factors influencing the decision. The selection of wrong career results not only in wastage of individuals' capabilities or potential but also depletion of resources in the form of time and money. Further, on a larger

scale wrong career results in endangering the sustainability and success of organisations eventually hampering the economic advancement of a nation.

The importance of selecting an appropriate career cannot be undermined and owing to its complex nature, several studies have been conducted to contemplate how the career decision is made and what are the crucial factors influencing this decision. Career-Maturity-Inventory (CMI) is a 50-item standardisation model formulated by John Crites in 1973, to assess the career selection process followed by adults as well as minors in career development. The standardized model evaluated career planning competencies of students plus their keenness in formation of suitable vocational plans, besides their awareness about ones' nature and work

settings [5]. Further, a hierarchical model was developed namely Crites-Model for career maturity to realise better understanding of career selection process [6]. This model was based on four parameters: (i) career-choice attitudes, (ii) career-choice competencies, (iii) consistency of career-choices, (iv) realism of career-choices [7]. These studies corresponded that the selection process is an intricate task and comprises of difficult procedure of decision making. As per the studies, copious factors influence the decision which may be extrinsic, intrinsic or comparable consequence of the two. Intrinsic factors comprise the personality traits of an individual like interests/hobbies, cultural identity and self-prominence while role models, ethnic background, parental influence, socio-economic status, resource availability, educational qualifications etc., form the extrinsic factors affecting career decision-making [8, 9]. Accordingly, attitude, career related interests and motivation emerge as prominent factors in enhancement of career development and engagement [4]. Nonetheless, there exists a lack of understanding of the intentions behind the selection made followed by the attitudes and influences that reinforce them. The decision for selecting a career came down to students studying in their 10th and 12th standards, which act as critical points in their lives. At this stage, they have to make important decisions regarding their future in academics as well as in workforce. The students are in the age group of 16-18 years and substantially lack competence to select a career path. Further, neither they are aware about the courses which will best suite their potentials nor about the requirements to work in a specific field. Additionally, the growing automation of works has changed the career choices to a great extent [1]. A lot of potential job loss is being witnessed, though new job market has also emerged resulting in creation of new occupations and industries. Hence, a need for continuous guidance and counselling throughout the development of an individual starting from school environment exists, so as to keep up with the technological change [3]. The traditional manual approach followed in career counselling and guidance is inefficient

and futile owing to imbalance in ratio between number of students and career experts. Besides, the manual approach proves to be inept and futile due to reasons such as non-availability of human counsellors, scarcity of full-time career counselors in schools, non-accessibility of career counselors, and the lack of professionalism in career counsellors with time followed by insufficient assistance offered due to increase in new tertiary institutes and courses [9-11].

In this study, five sections are framed. Section II puts some light over the recent advancements in this field followed by section III that offers an in depth review of state of art schemes. The implications from the contemplated work are presented in Section IV and finally, the paper clinches in Section V.

RECENT ADVANCES

This advancement in technology is paving a way for automating the career counselling and guidance process with the help of numerous techniques such as AI, data mining etc. A more pervasive solution can be achieved by means of Artificial Neural Networks (ANN) as they are able to mimic the cognitive ability of human experts more accurately than any other technologies. Several solutions applied currently in market are in the form of expert systems. Experts systems are an implementation of AI and form a popular field [12]. Such systems use different techniques to emulate behavior of human experts.

Expert System

Expert system (ES) is usually constructed as Knowledge-Base (KB), which employs contemporary computer systems to store exceedingly complex unstructured as well as structured information. Knowledge-Base systems appear as computer applications representing non-algorithmic capability for delivering solution to particular problem. A Rule-Base (RB) approach employed in KB for construction of inference engine enabling attainment of information through experience [13]. However, they form systems contemplating limited factors and have restricted scope [14].

The Figure 1 highlights the fundamental architecture of an Expert System, which include:

1. Knowledge Base: comprises the purview knowledge vital for elucidating problem. The knowledge base can be constructed with different approaches like by using a set of rules or using decision-tree model.
2. Working memory: includes collection of facts employed for matching.
3. Inference Engine: is the block where processing is done. Necessary actions are taken if the conditions are satisfied by the information entered by user.
4. User Interface: forms the communication link among the user and the expert system [11].

Such systems make usage of empirical knowledge followed by employing a heuristic tactic to deliver best solutions for seriously structured problems such as career selection. Furthermore, for any problem best decision

can be attained by such techniques as they offer competence of incorporating empirical knowledge, expert judgements, heuristic rules, engineering intuition, and mathematical models. Thus, presenting valuable assistances to users and ultimately supervising them in decision making [15].

Case Based Reasoning (CBR)

Case based Reasoning is one of the attractive methodology to implement the ES. This system comprises of Case-Base module, which is the centre on which this technique is based. The Case-Base is primarily a collection of experience items (cases) solved previously. Whenever a new problem is encountered solution of previously solved cases is reused. This technique is also referred to as memory based or K-nearest neighbour algorithm or instance based algorithm. The CBR lifecycle is shown in Figure 2, which is based on principle of Retrieve-Reuse-Revise-Retain.

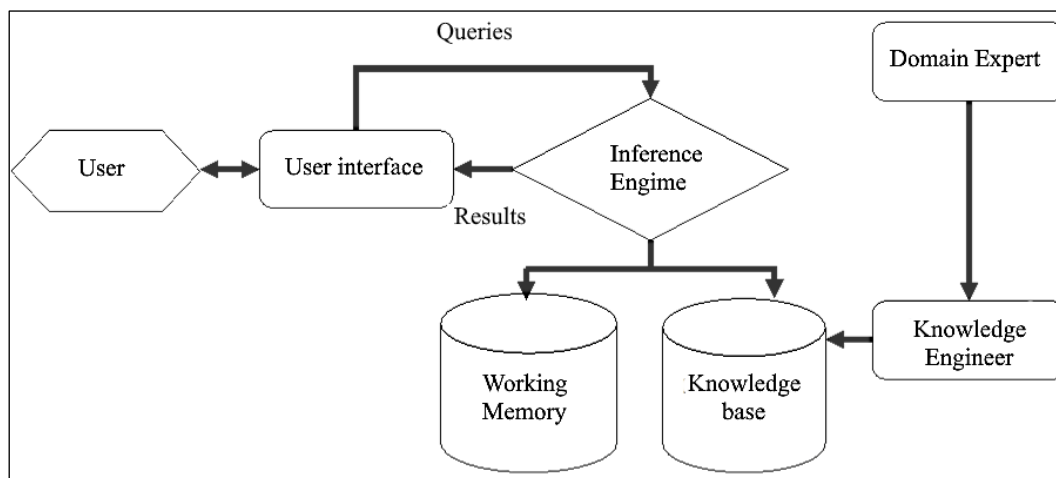


Fig. 1: Expert System.

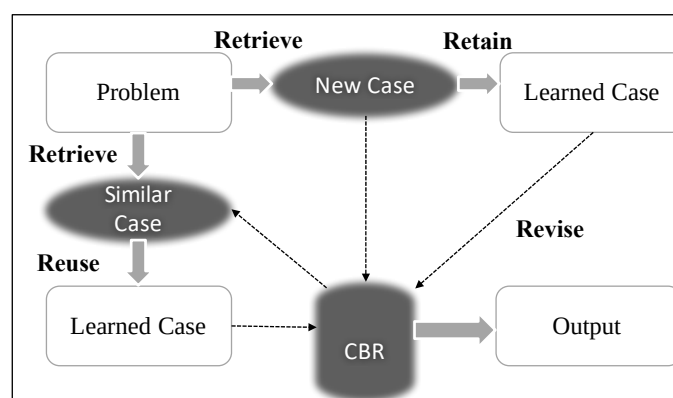


Fig. 2: Case Based Expert System.

The retrieve step involves recovering cases from Case-Base which are similar to problem under consideration. This is achieved with the help of similarity matrix. Some standard and widely used similarity metrics include: Manhattan distance, Euclidean Norm, Hamming Distance and so on. The Reuse step makes use of solution of retrieved cases for problem in hand. In the revise step, the offered solution/solutions are adapted or revised. Lastly, the retain step involves saving the new case in Case-Base for adaptability purpose.

A more reliable and effective system can be developed using advanced variant of ANN i.e. deep learning technology, which outsmarts in performance as well as in accuracy than the traditional machine learning techniques. Consequently, ANN calls for special attention of researchers owing to its huge potential.

RELATED WORK

This section deliberates the state of art solutions present in the field of career counselling and guidance.

A web-based expert system has been presented in [10], which aims to deliver career guidance to higher secondary students in India. Among the numerous courses available in Pondicherry Engineering College, the system assists students in choosing apt under-graduate courses. The presented model incorporates jSoup as a parsing technique to acquire information about various courses from web pages. This very information has been utilized for construction of Knowledge-Base, which constitutes a protuberant module of the offered system. Further, the Knowledge-Base has been classified as per the admission norms of university and student preferences while following a IF-THEN principle. Appropriate guidance in the form of recommendations is supplied to students as per details provided by them. The details include the academic scores while other principal factors such as personality traits, Intelligent Quotient (IQ), which have significant contribution in career decision making have not been evaluated. Moreover, it is a customized system developed specifically for students aspiring to take admissions in Pondicherry Engineering

College. Hence, fails to deliver a generic solution hampering its wide scale adoptability.

An online intelligent career guidance framework operating with comparable reasoning that of human career counsellors has been presented in [11]. The students from pre-tertiary science stream are under consideration aspiring to take admissions in higher institutions of Nigeria. The proposed model enables students to directly and independently avail the services offered by the system from any place and at any time via smart phones or desktops. A Rule-Based expert system utilising forward chaining has been implemented while manipulating various factors linked to students like favourite combination of science stream subjects, IQ followed by analysis of results of career interest inventory to provide career recommendations. A sample space of 200 science students have been considered which actively participated in career-selection tests. Result evaluation revealed that overall 95% of the suggested careers were found to be accurate and relevant, 80% of the delivered information appeared to be adequate while 70% proved to be satisfactory. However, only students of specific stream have been contemplated i.e. only science field while ignoring non-science streams. Moreover, limited parameters affecting the decision have been manipulated.

A machine learning approach has been employed in [12], where an ANN model has been constructed in MATLAB to aid human career counsellors in attaining better decisions. The presented framework contemplates behavioural characteristics of an individual to reach to decisions suggesting suitable career or vocational streams. Capabilities of individual in different fields are evaluated using SKAT-Scientific Knowledge and Aptitude Test ensued by DAT-Differential Aptitude Test battery. The model has been designed using multi-layer feedforward network and Levenberg-Marquardt (LM) algorithm, a variant of back-propagation. Statistical measurement techniques were utilised for evaluating the system. Between ANN and Discriminant-Function-Analysis (DFA),

results showed an agreement of 91% was seen for entire test cases. Two experienced human counsellors were involved in evaluation process and both were in 81% agreement with ANN classification results. Nevertheless, the two counsellors were noticed to be in 27% disagreement with each other over the results. Moreover, other prominent impacts (socio-economic status, cognitive style interest, etc.) which play significant role in decision for career selection have not been anticipated. Further, smaller sample space has been evaluated hence targeting limited population.

In [16], the psychological conditions of students are analysed to deliver better career guidance. An automated solution has been constructed using C4.5 algorithm for achieving accurate prediction by applying statistical co-relations on the results. The offered scheme employs pattern mode learning in comparison to batch-mode learning. Sample spaces of 200 students have been contemplated as per 12 parameters: leadership, team work, honesty etc. Accuracy of 86% has been achieved which vary according to parameters like size of sample space etc. Further, important parameters like IQ, academics score have not been measured, which play a significant role in guiding career selection. Smaller dataset has been deliberated, hence hampering wider acceptability. Better results could be achieved using newer intelligent technologies like rough sets analysis.

In [17], an expert system is constructed as an online web access by employing agent technology and AI. The system has been designed for college students seeking guidance to issues in their professional lives. The proposed system acquires knowledge automatically from the beneficiary to determine their issues and accordingly deliver assistance. However, the authors fail to provide a clear distinguish in the attributes used in construction of the system. Moreover, the proposed system has not been evaluated in terms of system performance, acceptance of results etc. Besides, neither contemplated the academic scores nor the personality traits of a student are evaluated, which constitute

important parameters in offering career guidance.

In [18], a predictor model employing copious parameters (grants, established publications, projects and exhibits, education, professional experience and academic performance) has been proposed to recommend appropriate job positions. The classification has been done using Naïve Bayesian classifier. The sample space of 7500 resumes have been contemplated which are acquired using online job websites (naukri.com or monster.com). The system employs Hadoop technique to handle analysis of data and deliver appropriate results. However, the evaluation in terms of system performance, acceptance of results has not been presented.

In [19], an automated guidance system has been developed for counselling scientific students in Morocco towards an appropriate career pathway in engineering. The students are classified into their main skills as per the skill test followed by their grade points. The model formed compares the high school data present as grade points and skills in scientific subjects with the data delivered by engineering institution, so as to decide which engineering stream a student can opt for. The system considers grade points of 50 scientific students studying in final year of the high school, so as to estimate their affection. As per the result analysis, it was revealed that the actual Moroccan educational system lead to wrong career selection. However, the contemplated sample space is comparatively small penalizing wider adoption. Furthermore, students of only science background are considered to recommend them appropriate engineering stream while ignoring rest of the fields.

Nigerian universities were facing problems while selection of candidates for the several courses offered by them as the number of applicants were far more than the number of available seats. This issue highlights the uncertainty that exists among youth regarding their selection of career. One such attempt to solve this problem was put forward in [20]. A counsellor driven, stand-

alone ANN based model has been presented to guide and counsel students in selecting an accurate career as per their capabilities. The model enables human counsellors to recommend students with appropriate courses offered in numerous Nigerian Universities. Several factors influencing students' performance have been recognized and evaluated in the framework. The factors which constitute the input parameters to the designed ANN framework include: academic scores of pre-tertiary and tertiary levels followed by types and location of attended tertiary institutes along with gender, age, and family background etc. The training of the multilayer perceptron was done by means of data acquired from questionnaires of final year science students of Nigerian University of Ilorin and Kano University. But again, only students of science stream have been deliberated in the system while overlooking rest of the education streams. Hence, impeding wider acceptability. Moreover, neither the personality traits which constitute an important component in decision of career selection has been identified nor a suitable mechanism has been utilised for its precise recognition.

A self-updating web based expert system offering career guidance by recommending suitable under-graduate courses to students seeking admission in several colleges in Pondicherry has been presented in [21]. Kappa-PC scheme has been employed for framing Knowledge-Base module along with utilising an Object-Oriented Database. jSoup parsing followed by pattern-matching techniques have been used for acquiring information from web-pages that are responsible for keeping the Knowledge-Base updated. The domain related queries form the system input and accordingly most significant recommendations are delivered as output by the designed framework. However, the system fails to consider the important factors like influence of family, personality traits etc., which form important aspects in career selection. Moreover, the presented scheme has been constructed for students of restricted geographical location. Hence, impeding wider acceptances.

Using a rule-based decision support system and active machine learning practices, a career advice model has been proposed in [22] to assist students in decision-making process for suitable career choice. The model has been designed using Java programming language. Both the fuzzy logic technique and the Myers-Briggs Type Indicator (MBTI) model has been utilised in the system for identification of individual personalities. Moreover, comparative analyse with several contemporary schemes have been performed along with intense analysis of academic abilities through tests. Nevertheless, due to the smaller sample space considered wide scale adoption of the presented scheme is confined.

A web-based online career counselling framework has been constructed in [23]. WAMP (Windows-Apache-MySQL-PHP) technology has been employed in the offered system to formulate career quiz based on hobbies/skills/interests of students. Suitable career paths are suggested to students studying at pre-tertiary levels after better understanding of their abilities. Surveys followed by interviews of human counsellors were the main sources from which data was acquired and eventually were used in designing the system. 76% of accuracy was revealed from result evaluation. However, various parameters such as personality traits of students and IQ etc., which play significant role in directing the decision of career selection and its life-long recognition have not been contemplated. Moreover, due to the smaller sample space pondered, the results of the presented study prove to be unconvincing for its large scale acceptance.

A Decision-Support-System based Expert system has been presented in [24], assisting fresher students in selection of apposite course in Gomal University, Pakistan. The proposed model utilises CLIPS language to construct rules-based Decision support system. As revealed from module testing, suitable recommendations in the form of apt courses are presented to fresher students. However, limited audience have been targeted while being a stand-alone application. Moreover, various parameters such as personality traits of

students and IQ etc., which direct the career selection have not been scrutinized.

An automatic counselling system based on a Decision-Support-System has been imparted in [25], to enable Nigerian student in their higher secondary levels choose suitable careers. The proposed framework enables human counsellors to reach at better decisions, hence result in bringing better assistance to students. The model has contemplated copious parameters to arrive to a decision such as ability, hobbies, IQ, interest, skills, past academic performances, preferences, parental influence followed by parent occupation. However, the system has been implemented using Visual-Basics (VB) as a stand-alone application resulting in limited access to its services. Further, the services can be availed only by human counsellor while the students cannot directly access the offered services. Besides, a proper mechanism to recognise the personality traits of an individual has not been deliberated.

An automated expert system has been developed in [26], for students in Pakistan to provide counselling and guidance in their careers. A collation between the CBR techniques and J48 (a decision tree algorithm) has been conducted in the study. Factors such as skills, grades, hobbies, students IQ, gender, have been pondered in the system and act as an input to the designed model. The result analysis revealed that CBR performs better than J48 by delivering higher accuracy of 80% in contrast to 60%. Conversely, the scope of the system is limited to constricted geographical location and students of specific culture have been deliberated. Thus, failing to offer a standard solution able to target larger population. Moreover, a smaller sample space has been pondered to carry the training and testing of the proposed system, which hampers the acceptability of proffered results.

In Malaysia, an expert system aimed to provide guidance to high school students for appropriate career selection has been implemented in [27]. The model implements a web-based framework allowing online access to users from any location and at any time.

CBR principle has been implemented in the system, where the information obtained from counselling professionals and guidance coaches has been utilised in construction of Knowledge-Base. Personality traits, interests and students' profiles are used for building the database. Nonetheless, wider adoptability of the presented system is hampered as limited population of specific geographical area in Malaysia has been analysed. Moreover, inadequate parameters have been used for construction of the system, as important parameters such as IQ have been ignored, which have substantial contribution in career decision making process.

In order to automate the career counselling and guidance process, a CBR expert system has been implemented in [28]. A sample space of 1000 high school Nigerian students has been contemplated in the study, which are aspiring to choose suitable under-graduate courses. The model has been designed with help of Mat lab. Depending on the students' performance in specific subjects the recommendations are formulated accordingly. The study evaluated numerous similarity matrices where Euclidean Distance eventually emerged as a better algorithm with 0% classification error. Out of the 1000 cases considered, 800 were used for case-base construction while the remaining 200 cases were employed for carrying system test analysis. but, the system has deliberated inadequate parameters to reach to appropriate decisions, personality traits, IQ etc., which form prominent aspect in guiding career selection in the long run have not been contemplated.

In education field, qualitative data forms the basis for carrying out the data analysis. Therefore, necessity for a solution presenting analysis of significant amount of categorical data with minor loss and in minimum time exists. One such solution in the form of an ANN model has been offered in [29]. The analysis has been carried out with assistance from Cascade-Forward-Backpropagation-Neural-Network (CFBPN). The participant's characteristics are comprehended more clearly by the data analysis done by the presented model. The data collection in the study has

been by using open ended questions coming under the conceptual understanding test. However, smaller sample space of 210 participants has been considered, which decreases the acceptability of offered results. Besides, the model takes large time to train while being inept to explain the dual nature of samples. Also, the method is based on CFBPN which has its own restrictions.

Understanding and identification of individual personalities form an important module in the career decision making process. One such attempt was done by authors in [30], where a rough set technique has been utilised for analysis of mixed or combined personalities. When the data shows large deviation from normal distribution rough sets deliver much better results than statistical techniques. With rough sets, there exists substantial means of finding the sub categories. The data collection in the study has been prepared by using open ended questions coming under the conceptual understanding test. Out of the 60 cases considered, 29 emerged to have mixed personality. The result analysis was operational but the several other parameters must be contemplated to deliver effective analysis. Moreover, a smaller sampler space has been deliberated. Beside, only Likert-Type scale has been considered which leads to same aggregate scores for responses to different statements.

The main contributions followed by the shortcomings of the appraised schemes have been tabulated in Table 1 as under:

CHALLENGES AND OPEN ISSUES

Imminent future will witness no stable jobs, but will call for continued upgradation of skills to survive in work places. Consequently, career counselling has a high demand and scope to assist individuals at any stage of their career. Therefore, it is high time to investigate the issues and challenges that exist and obstruct the development of an effective and competent automated career guidance module capable of delivering continued support and appropriate recommendations to youth so they are able to survive this transition. Numerous issues identified from the review conducted

requiring attention of research community are as under:

- The increasing automation followed by digitization of work has a huge influence in shaping the career counselling, career choices and career development process. Therefore, the conventional approach followed to give career counselling and guidance must be upgraded and can be made effective by consideration of factors that have not been anticipated formerly [10-12], [20], [23-25], [27, 28]. On such parameter is the personality traits of an individual, which form a prominent attribute in depicting the type of career suited for an individual in long run.
- With increased digitization and economical changes, it is likely to witness additional new competencies, attitude and behaviours among youth. To handle such a transition, the system should be adaptive in nature while delivering accurate results and being economical. However, systems developed using numerous technologies such as genetic algorithms, advanced statistical models, Data Mining etc. [26], [22], offer high complex and difficult to maintain system which are not adaptive in nature.
- Identification of what personalities, attitudes or behaviours individual carry is a major concern before thriving in the upcoming economy. There does not exist a proper mechanism to understand and identify the personality of an individual. Confined research has been conducted in this context and among the several offered solutions none were able to provide effective results [29, 30].
- Larger acceptance of schemes [10, 11], [14], [22, 23], [25, 26], [29, 30], can't be guaranteed as smaller sample space has been employed in training and testing of such systems. Hence, restricting acceptability of such solutions on larger scale.
- Certain solutions [10, 11], [20], [23], [25-27], presented as stand-alone systems were customised for students of specific culture in a particular geographical area and educational background. Thus, failing to deliver a generic solution.

Table 1: Review of Work.

Paper	Contribution	Shortcomings
[10]	Offers assistance in selection of courses available at Pondicherry Engineering College.	- Limited scope followed by utilising a smaller dataset. - Acquires knowledge through internet websites while employing insufficient parameters.
[11]	Presents an online intelligent system delivering guidance to students of science stream in Nigeria.	- Unreliable sources utilised for knowledge-base construction. - Smaller sample space confined to students of specific educational background has been employed. - Confined features used for construction of system.
[12]	Provides automated solution to aid decision making of human counsellors using machine learning.	- Smaller sample space has been considered. - Inadequate parameter selection.
[16]	Delivers a mechanism where the psychological conditions of students are analysed to deliver better career guidance.	- Smaller dataset has been considered hence hampering wider acceptability. - Prominent parameters like IQ, academics score have not been considered.
[17]	Proposes an expert system constructed as a web access by employing agent technology and AI.	- Fails to provide a clear distinguish of the attributes used in construction of the system. - Evaluation in terms of system performance, acceptance of results not performed. - Important parameters like academic scores personality traits of a student not contemplated.
[18]	Presents a predictor model to recommend appropriate job positions	Evaluation in terms of system performance, acceptance of results not performed.
[19]	Suggests an automated guidance system for counselling scientific students towards a suitable career pathway in engineering.	- The contemplated sample space is comparatively small penalizing wider adoption. - Students of only science background are considered to recommend them appropriate engineering stream.
[20]	Delivers a standalone, counsellor-driven ANN based expert system for certain Universities of Nigeria.	- Contemplates inadequate parameters while employing smaller dataset. - Restricted scope.
[21]	Proposes an web-based self-updating ES for undergraduate course selection in several colleges in Pondicherry.	- Employs internet to gather knowledge. - Limited factors have been utilized for system construction. - Inept to scale well.
[22]	Delivers a career advice model engaging active machine learning frameworks.	- Limited parameter selection. - Smaller dataset used in the system. - The offered system emerges as a complex system.
[23]	Presents a web-based career counselling structure via WAMP technology.	- Ignores prominent factors like students' IQ, personality traits etc. - Confined to 50 students dataset.
[24]	Delivers an expert system for course selection at Gomal University in Pakistan.	- Limited population has been targeted. - Lacks appropriate selection of parameters.
[25]	Proposes a Decision Support System for higher-secondary students in Nigeria.	Lacks appropriate mechanism for identifying personality traits.
[26]	Proposes an automated career counselling system employing Decision-Tree and CBR techniques.	- Limited sample space considered. - Emerges out as a complex system difficult to maintain.
[27]	Presents a CBR expert system for tertiary-level students at Nigeria.	Personality characteristics of an individual are not evaluated.
[28]	Offers a web-based expert system for using CBR for tertiary-level students in Malaysia.	- Insufficient selection of parameters. - Limited sample space has been employed.
[29]	Proposes an ANN model intended for qualitative analysis in edification field.	Smaller sample space of 210 individuals has been evaluated.
[30]	Offers an identification of individual personalities via qualitative analysis centered on rough set.	- Analysis restricted to Likert-type attitude scales. - Takes large training time. - Confined dataset has been contemplated.

- Certain solutions employed internet as a source for collecting information. However, acquiring relevant information from internet, which forms hub of heterogeneous information available in large volumes, is quite difficult. Moreover, dynamic nature of information and identification reliable sources on internet comes up as additional challenges for such systems. Thus, standard realisation of such systems is precinct [10, 11], [21], [23], [27].
- Substantial privacy and confidentiality risks exit in systems using web as a source of accessing their services. Moreover, restricted access to internet will hamper their availability [10, 11], [21], [23], [27].

CONCLUSION

In this paper, the appraisal of copious state of art schemes present in the field of career counselling and guidance has been presented. From the review conducted, each scheme was found to have loopholes in one aspect or the other. Moreover, the challenges deduced from the review conducted were explicitly highlighted. The research inferences, the need for an effective and reliable expert system, which have a continued existence while being able to handle the emphasized issues.

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