AN APPROACH FOR DESIGNING A HYPOTHETICAL MODEL TO PREDICT STUDENTS EMPLOYABILITY STATUS USING DEEP LEARNING

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ABSTRACT

Unemployability is a challenging problem as compared to unemployment which needs to be addressed well. To address this problem it is necessary to understand the gap or the incompatibility in Industry 4.0 and Education 4.0. The standards of education need to be increased so as to match the potential needs of Industry 4.0. Higher educational institutes should comprehend with the changing needs of the industry and make a step forward to bring reforms in their teaching and learning process so that they can make students ready for the current dynamic job market. The research study aims to find out how the use of current technological advancement and algorithms of Artificial Intelligence can help in resolving this issue. Also the research study targets on the most significant quality attribute which the employers are seeking in employee. It further suggests a hypothetical predictive model which predicts the employability status of the students. This study will be of great help to the educational institution as the prediction which will be obtained from the model can help in intervening in between and will help the purpose of guiding the students who are at risk and need some improvement in them so as to increase their chances of employability. This predictive model implementation will have a positive effect on attracting more and more students at their institute and will help in increasing the overall success rate of institute.

Keywords: Unemployability, unemployment, employability, Education 4.0, Industry 4.0, predictive model.

Introduction

According to the eighth edition of India Skills Report (ISR) less than half of the Indian graduates are employable. This problem of graduate employability is a critical issue faced by the students and other stakeholders of the educational institute. The main purpose of the educational institute is to provide quality education. Educational institute offering higher education strives at providing quality education to their students. Quality education aims at holistic development of student. The holistic approach means not only to focus on the academic skills but also to concentrate on other skills required for the overall development and future prospects of students in their life. The ultimate aim of gaining higher education is to gain employability. Employability is a set of skills, achievements and understanding required that makes graduates more likely to be employable. The more higher the chances of employability of students the higher is the success rate of the institute. In today's era there is a tremendous advancement in technology, making use of appropriate technological advancement applicable to the area of education will help in gaining benefit in this area.

EDM (Educational Data Mining) is an emerging field which deals with several issues faced by educational institute. It aims at converting the raw data into a meaningful data which can provide more insight and be more useful to the educational institute. Today we see in each and every field, data the main driving force has revolutionized each and every sector. The education sector can also achieve great advantage with the proper use of data and its analysis. This field has been emerged from application of Data Mining on educational data. There are different methods and techniques used in this field.

An area known as Predictive analytics which is a part of advanced analytics can be used to identify the patterns in the data. Predictive analytics can be applied to Educational data to solve the different issues faced by the different stakeholders of the institute. Using past data it can be used to predict the future data. In educational institute the success of the institute is completely centered over their students and the factors like academic success of the students, the number of students getting placed is very crucial to the educational institute. The current problem of employability of students can be addressed well using predictive analytics. Identifying the main quality factors affecting employability of students and assessing these factors can help in predicting employability status of the students. Making aware of the employability status to the students as well as other stakeholders of the institute well in advance will help in increasing the chances of employability.

There are various research studies which focus on predicting the employability of students using data mining and machine learning techniques. The present research study focuses on the use of deep learning technique for predicting employability. The study further deals with designing a predictive model which predicts employability status and discusses the various steps required to build the model. The literature which addresses the problem accomplishes that there are still many opportunities available in the current area of problem and this study should be addressed in a more systematic and detailed manner. There are still many challenges faced in the problem such as exploring the precise factors affecting employability which still needs to be explored. Utilizing the appropriate techniques and algorithms is also a challenge in this area. The use of deep learning in this field is still at an initial stage and therefore the researchers have a scope to explore the use of deep learning algorithm in the current area of research. This study seeks to apply a deep learning algorithm to forecast the employability of the students and to evaluate their signs of skill set.

Employability is defined different by different people. The student should be an all-rounder with respect to skills to face the challenges of the global market. With increased changes due to the Industry 4.0 revolution the expectation has also increased from the students. They are in need of students who are not only expert in their academics but also expert in the non-technical skills. In general the student should possess generic employability skills. The development in the skillets of students can take place with a proper training and mentoring process. Providing general training to all type of students may not serve the required purpose. As the shortcomings of each and every individual is different the mentoring and guidance required is also of different type. Making the students aware of the job specific skills is also an important task before trying to prepare them for the employability. Understanding the minute details of the job specific/required skills will make them think in that particular direction. Identification of lack of skills in the students and putting them in a proper training process will make the process simple and make changes in the overall output from the system. Identification of proper skills as expected by the employer, industry can also help to improve the process.

Significance of the Study
Employability issue is of great concern to our country. Nearly 50% of the total population of India is youth. The youth need to be trained in skills according to the expectation of Industry 4.0. There should be gap reduction in expectation of employer and perception of students. This study will be of great importance to education sector. According to the India Skill Report (ISR) 2022 India's employability rate has been increased marginally from 45.97 percent to 46.2 percent, but this increase is not up to the mark. There is still large scope and opportunity to increase this rate and make the country free with unemployment issue.

Currently, we see that the higher education institutes are facing certain issues regarding placements of the students. There is a need to the students, Teacher and management of the education institute to understand well in advance the issue of their student's failure in placements despite of the requirement in the job market. To find out the prediction status for employability of students at an early stage will help in increasing the overall student success rate. There is a huge gap in the expectation of the employer and the perception of graduates. There is a need in the increase of generic skills in students so that they can compete with the current global trends. Making students aware of the job specific skills and making the students work in this process during their graduation will help in intervening in between and will have a positive effect on increasing their chances of employability.

Literature Review
The literature provides a brief understanding of the various tools and technologies that can be used to address the problem of unemployment. There are various studies which focus on the problem of predicting academic performance of students but there is scarcity of research done in the field of employability prediction, also there are limited parameters considered for prediction and more research should be done on finding the right attributes of prediction. (Mishra, Gupta 2017). The research on such type of prediction is important to students, teachers and stakeholders of educational institute. As lot of data is available with the educational institute it is easy for the institute to use students information and predict employability using different attributes (Vadivu, Sornalakshmi 2017) which will affect the success rate of the institute and will be of great help to the students. It will also help in the overall mentoring process of weak students. Providing remedial solutions to weak students can also improve the overall process. Identifying weak students in the particular area is also important which can be achieved by using proper tools and techniques (Kumar, Vamsidhar, Harika, Nissy 2019). Also the use of predictive analytics in the education domain is also effective. The effectiveness of predictive analytics in addressing different issues in the education domain for improving the quality of education is important. As quality education is basis for sustainable and prosperous future, addressing the different issues related is a must. (Kawachale, Satao 2016). There are various areas in education domain which can be addressed well with the use of predictive analytics. Predicting employability by selecting quality and effective set of attributes is also a challenge in the research study (Casuat, Festijio 2020).(Casuat, Julius, Evangelista, Christina 2020) further has

suggested a way of finding dominant factor by using feature selection methods and also has shown the effectiveness of the system designed for Student Employability Prediction using Logistic Regression Model. Designing Classification models is also one of the techniques employed for prediction which uses data mining technique by considering possible attributes. (Vasan, Kumar, Sharma, Chauhan 2018). Data regarding mapping of the skill sets of student with the company's requirement criteria is also important as it will also do addition in the selection of the students and add for their chances of getting selected. (Bharambe, More, Mulchandani, Shankarmani, Shinde 2017)**.** In a big data environment an intelligent system using data mining techniques on employability data is implemented using Hadoop. The study deals with the entire process right from Data Collection to result visualization (Saouabi, Ezzati 2019).To make the prediction more effective use of Ensemble based classifiers is investigated (Dutta, Bandyopadhyaya 2020). Thus such type of predictive system is a need of the hour and will be beneficial to the educational institute as well as the society. To gain more accurate and better performance selection of quality attributes and proper use of tools and techniques is equally important.

Deep Learning Models for Employability Prediction: -Employability prediction is an important task in the lifecycle of the student's graduate process. It is the main attribute which decides the quality and success of the institute. Predictive models can use machine learning or deep learning but use of deep learning will make a considerable improvement in gaining the overall accuracy in the process. The Neural Network model is generally built using the inspiration of the working of a human brain. Building a model using deep neural network requires basically three layers. The input layer which is used to pass the features of the dataset. This layer just acts as an input no computation is carried in this layer. It passes the features to the hidden layer. The hidden layers are usually the layers between the input layer and the output layer and there can be more than one hidden layer. These layers perform the computations and pass the information to the output layer. The output layer represents the layer which is responsible for generating the results after training the model. It produces the output variables.

Proposed Methodology
Generally there are four core components of a Predictive Model Building a predictive model is very challenging work. To build a predictive model, we require four important components. These components are listed below for easy reference.

1. The Methodology followed to deploy the model.
2. Techniques adopted to build the prediction model.
3. Input attributes used by the model and
4. Performance Metrics used to evaluate the model.

The research study will focus in building a predictive model which will identify and make use of the dominant attributes for building the prediction model and we need to check the accuracy of the model using performance metrics.

In the research study to address the problem of employability the study uses a novel approach. The prediction will be based on utilizing a deep learning algorithm. The prediction model will take inputs as parameters and generate an output showing the status of employability of students. The inputs will be based on Data Collection step this data will be primary data on which the status is to be checked. Data of different skill sets which are a strong indicator of employability are selected for the prediction. The details of the workflow of the proposed hypothetical model is as given below

Workflow for the proposed model
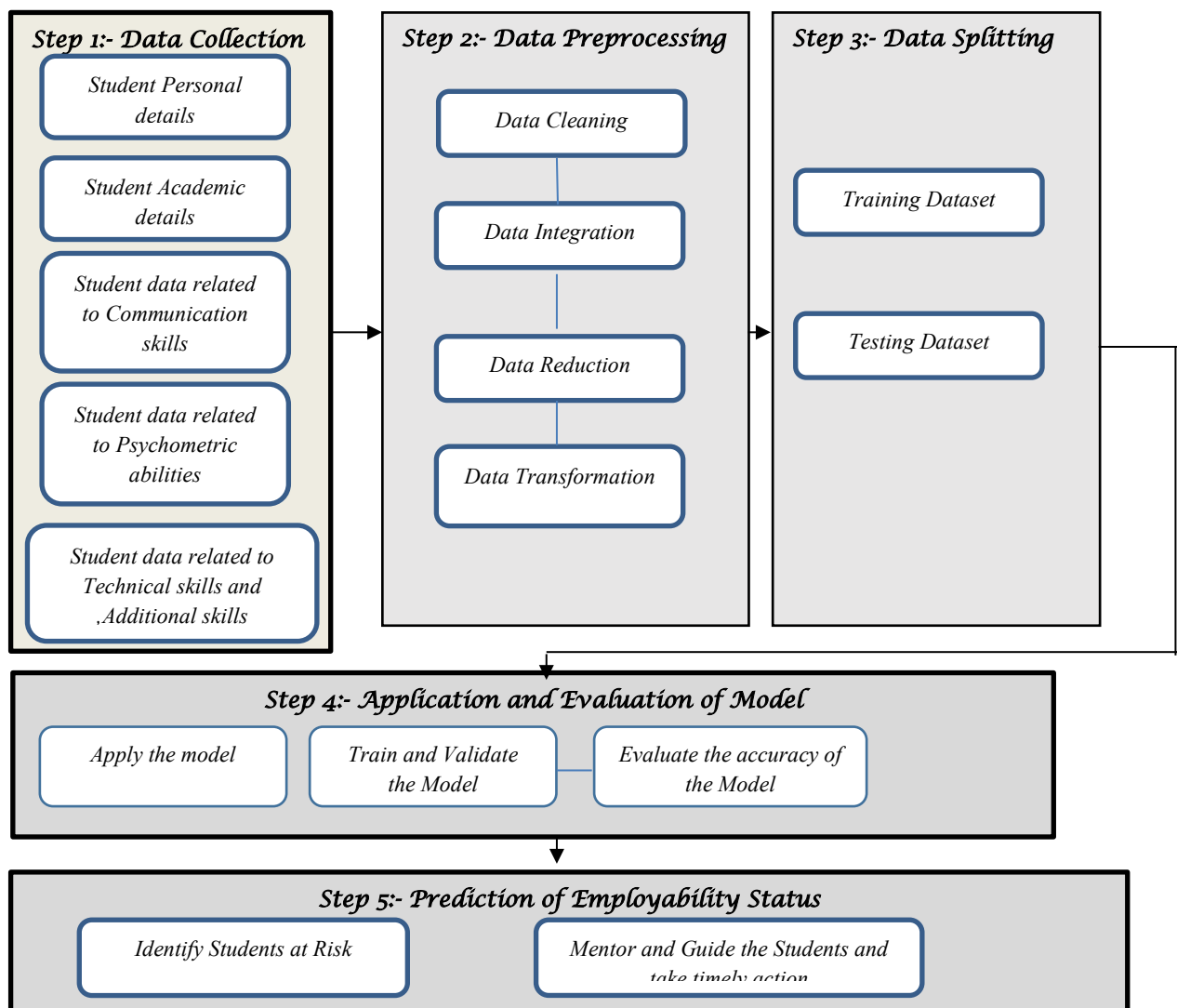
Figure 1

The model will be designed following a systematic procedure.

Step 1:- Data Collection: -To correctly predict the employability status of the students the first important step is Data Collection. The research problem addresses predicting the employability status of the students. To predict well the demographic data of the students, the academic details of the students, skills possessed by the students in various areas like soft skills, technical skills and his overall behavior which can be collected through the psychometric features. These all related features need to be collected from the students. The data collection technique will be based on collecting responses through Questionnaire to the students and the students overall performance in the selected features can be used as the input variables to the model. The assessment of different parameters considered can be considered as input to the prediction process of Neural Network.

Step 2:- Data preprocessing: - To make the data collected ready to feed to the model data preprocessing is required. This step will consist of various sub steps like Data cleaning, Data Integration, Data Reduction and Data Transformation. To make the data in a suitable format this preprocessing step is required. After this step the data is ready for the next step

Step 3:- Data splitting: -The dataset will be divided into main 2 parts i.e.:- Training and Testing. The dataset of training will be utilized to train the model and the evaluation of the model will be performed on the testing data sets. This splitting is required to understand how the model is behaving for test dataset.

Step 4:- Application and Evaluation of Model:- In this step the model will be evaluated based on different evaluation metrics to understand the model's performance In this step the model accuracy, its precision will be checked.

Step 5:- Prediction of Employability status: -This is the output step of the model which will give an overview of the status of employability of the student. The model will be able to identify the students who are at high risk and need to give rigorous training and mentoring so as to increase their chances of employability.

Advantages of Proposed Model

There is a need for evaluating the status of employability in educational institute. The proposed model will help to identify the students at risk and help the students, educational institute to take timely and appropriate actions. Evaluating the students based on the selected attributes which are necessary for the selection of the candidate for any job will inform the student about the area where they are lagging behind. Performing a proper analysis on the status of employability of students, the educational institute can arrange training and skill development programs in the most common areas where the maximum students are lagging behind.

Conclusion

In India the rate of unemployment is rising steadily the research study will act as an important contribution towards prediction of employability which will act as a preventive measure. It can bring a major impact on the traditional way of predicting employability. This problem of prediction is quite complex but due to the deep learning techniques there will be a greater chance of accuracy and the utilization of the model with a systematic data collection will have a great impact on the overall success rate of the institute. The society nowadays is greatly concerned with how the educational institute caters to the needs of the students and how well does the placements indicator of the institute rise. The model will help in intervening the performance of the students in between and will be able to provide a feedback of the same which can bring dramatic improvement and changes in the students and in turn increase their chances of employability.

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