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Student's Competency level Prediction

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Abstract: Companies always thrive to achieve best whether that be in the quality they offer or the freshers they recruit. Organizations recruit students who are effective and efficient in work and they have different techniques to determine this. This ability of being effective and efficient is known as competency. Various researchers have understood its importance and defined Competence from time to time. According to [1]Chan and her team (the University of Hong Kong)(2019) has defined competency as- the holistic competency is an umbrella term inclusive of different types of generic skills (e.g. critical thinking, problem-solving skills), positive values and attitudes (e.g. resilience, appreciation for others) which is essential for a student's life long learning and whole person development. Knowing one's Competency level is not an easy task. It needs a 360 degree view to understand it. Till now there is not a specific way of determining it. And graduates don't know their competency level until they face the recruitment process. Knowledge of competency level at an early stage is necessary for students to improve and invest their time to become more competent so as to get a job in their core field. To overcome this problem we are designing a system which would predict the competency level of the computer science engineer and related graduates. To build this system we are using unsupervised machine learning algorithms. The predicted competency level could be used by students to understand how hard they need to work so as to get a job in their core field.

I. INTRODUCTION

Nowadays getting a job in the core field of studies is not easy because of the gap between a student's knowledge and company's expectations. Students have knowledge and many skills but they don't know how good they are. Few students who score good marks lack the knowledge of their competency level, hence are not able to get a job in their core domain of study. On the other hand students who score average marks fail to acknowledge their competency level thus they lack confidence which again results in not getting a job. Thus having a regular check and keeping track of information gain and understanding is a must.

The approach used in this project uses machine learning algorithms to predict the competency level of the user. The 4 main steps involved in the implementation are as follows : Train Dataset, Data preprocessing, feature extraction and competency prediction. At the end the user will get his predicted competency level.

A. Motivation

By trying the competence-based approach instead of the "most traditional approach", IT companies started to think of students as having abilities and potentialities instead of having just marks with a particular set of activities they will be able to do inside the organization where they will work in future. In this competitive world, the organizations are focusing on the skills and knowledge rather than just focusing on marks. So competency is the key for organizations nowadays.

II. RELATED WORKS

The authors proposed model for the representation of competences able to support a wide range of scenarios where it is fundamental to model, organize and represent competences. The main subset of this model may be adopted to represent competencies of the students of undergraduate engineering students who are currently in their second or third year or maybe in first year. The authors defined a strategy to identify, manage and take advantage of competencies in the IT field to find out how suitable or capable the students are to work in IT sector in terms of their problem solving skills. The authors defined a scenario of the the underlying individual competencies. In such sense, competence modelling, namely the use of modelling techniques for capturing existing and describing desired individual competencies of students, offered an exhaustive number of study cases. The authors presented an examination of characteristics of competence modelling and recommendations and lessons learned from these cases for the practice of competence modelling. The authors presented competency representations an individual competence model. In particular, the individual competence model includes IT industry competency where students will get to know how competent they are in the current IT industry and how much practice they need to be more competent to survive in the IT industry and get a job. The suggested approach has proved that it is possible to capture capabilities of individuals with different educational background.

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In an effort to provide idea regarding the role of students in promoting their own individual effectiveness, authors said that attaining the goal of sustainable high performance in IT sector depends on developing skills based on individual learning. All this requires appropriate institutional and other platforms for skill practices to operate. In particular, in Public as well as in private IT organizations, the competency-based performance is expected from students accordingly to organizational structures and requirements, values and goals may lead learning programs, so students must prioritize them in order to improve effectively and efficiently their skills and getting higher performance.

A. The Adopted Competency Model

The key points of the adopted model are the terms competence and competency. A competency represents all the forms of knowledge, skill, attitude, ability and learning objective described in learning, training or professional areas. Thus, a competency is an element part of the competence. A competency is knowledge, skill or attitude (KSA). The knowledge means the information that a person may apply to do a task. The skill is the experience, the practical ability and the easiness in doing the task. The acquisition of a skill increases the ability of a person in doing action automatically and unconsciously. The attitude is the inclination of a person in doing actions as a response in particular situation. It includes affective and cognitive components that allow the individual student to recognize and opportunely deal with the situation and how to improve their skills accordingly.

III. PROPOSED SYSTEM

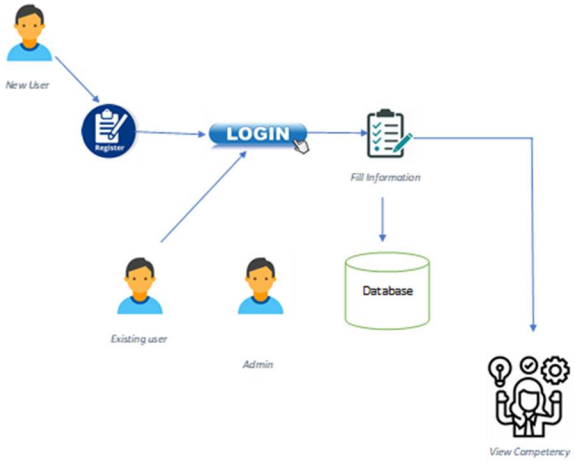


Fig: Proposed System

A. Algorithm

As the dataset contains unlabeled data and we cannot predict the output in advance before actually implementing it, so unsupervised machine learning algorithms are used. There may be students having similar skills so they should be grouped in order to determine competency. Hence clustering algorithms are used for grouping similar data purpose. Various algorithms are applied and compared

1) *K-Means Clustering:* k-means clustering is the simplest and effective method if we know the numbers of clusters in advance. The K-means clustering algorithm is used to find groups which have not been explicitly labeled in the data. This can be used to confirm business assumptions about what types of groups exist or to identify unknown groups in complex data sets. The number of clusters are five since we want competency on the scale of 5.
2) *Hierarchical Clustering:* To define hierarchies .
3) *BIRCH Algorithm:* It is used to perform hierarchical clustering and to accelerate the performance of k-means clustering

IV. CONCLUSION

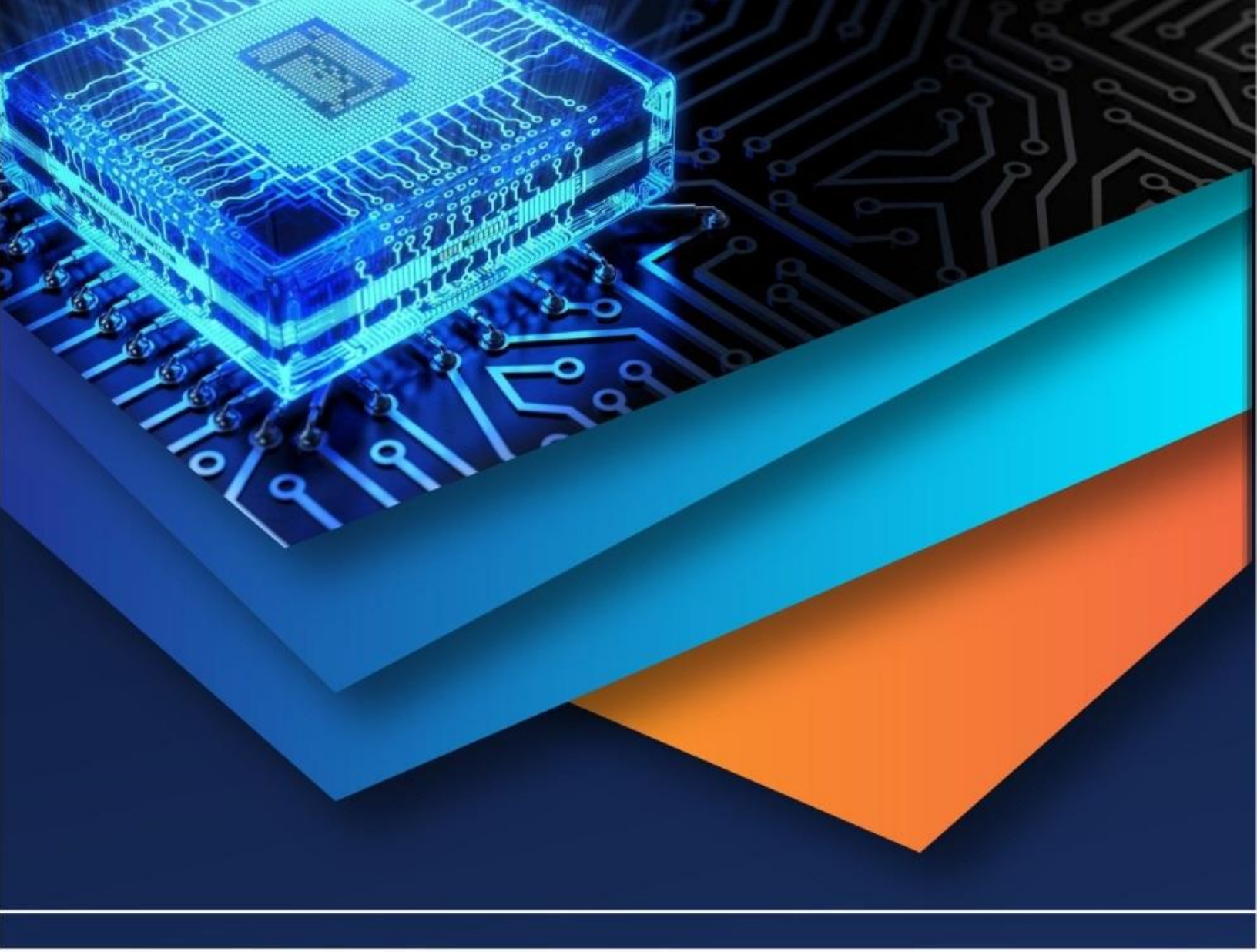
At a time of high interest in competence-based education, reliable and valid devices to assess competency is needed. The experiment is very helpful for students in second year and third year of engineering program to know their competency at early stages only so that they can start their preparation and improve their skills before appearing for their campus placements.

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