



## A Methodology for Student Competency Mapping to Boost their Profiles for Better Captivation in Industry

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**Abstract—** *In today's competitive age, placement is the buzz word for academic institutions and students. Opportunities in the job market are increased tremendously in the last decade and job offering organizations are also interested to conduct on-campus, off-campus and job fair with the synchronization of academic institutions. However, there are many students who are not able to get through the recruitment process and jobs. Therefore, it is a demand to develop a methodology that can scrutinize the student's profile, identify the lacking skills for available job positions, and advise them to acquire the necessary skill sets, suggest the appropriate pedagogy and ultimately make them prepared for better captivation in the industry. In this paper, we present a methodology for student competency mapping to boost their profiles for better captivation in industry by integrating knowledge-based expert information system.*

**Keywords—** *Competency Mapping, Expert System, Agent, Student Profile*

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### I. INTRODUCTION

In today's competitive age, placement is the buzz word for academic institutions and students. Every institution tries to maximize their placement ratio as parents and students prefer those institutions which help to place their wards for project training and job. For that, every institution is conducting activities like arrangement of on-campus and off-campus placement, preparation sessions for placement readiness etc. Organizations generally expected a set of competency from a student for a specific job title. Such competency includes soft skills, behavioral skills, application skills, subject command and many more. As globalization increases and organizations are span across a world, such skills are now a days become prerequisite of a specific job. Also, opportunities in the job market are increased tremendously in the last decade and job offering organizations are also interested to conduct on-campus, off-campus and job fair with the synchronization of academic institutions. However, there are many students who are not able to get through the recruitment process and jobs. Even though company's requirement is huge but they don't hire all the aspirants as they are looking for the prospective candidates for certain skills and abilities.

By considering the current placement scenario, it has been observed that there is a gap in industry demand and student profiles & their skill set. This gap can be filled with the logical interrogation of student profile with the available job positions. However, It is the complex task to evaluate competencies manually, as for various students, the gap between their skills verses industry demand is radically varying. Also, it is needed to take help of human experts to suggest how to fill this gap and such process should be performed without user intervention. Therefore, it is a demand to develop a methodology by integrating knowledge-based expert information system that can scrutinize the student's profile, identify the lacking skills for available job positions, and advise them to acquire the necessary skill sets, suggest the appropriate pedagogy and ultimately make them prepared for better captivation in the industry.

In artificial intelligence, an expert system is a computer program that simulates the judgment and behavior of a human or an organization that has expert knowledge and experience in a particular field [9]. Also, an agent is a computer program that works proactively on behalf of its users. Typically, knowledge-based systems enable users with a problem to consult a computer system as they would an expert advisor to diagnose what may be causing a problem and figure out how to solve a problem, perform a task, or make a decision. During such process, an expert system can also extract additional information from a user by asking questions related to the problem during a consultation. It can also answer questions asked by a user about why certain information is needed. It can make recommendations regarding the problem or decision at the end of a consultation, and it can explain the reasoning steps gone through to reach its conclusions when asked by a user. Such a system contains a knowledge base containing accumulated experience and a set of rules for applying the knowledge base to each particular situation that is described in the program.

### II. BACKGROUND/CURRENT STATUS OF ACTIVITIES IN THE AREA

Several competency models have been developed so far to measure student competency. But, it has been observed that there is no computerized system (especially expert system) has been developed so far to overcome the complexity arises in the manual competency mapping process. Also, competency mapping is the process is working upon various parameters that require strong groundwork. These parameters are only being captured from domain experts. A

knowledge-based expert system uses human knowledge to solve problems that normally would require human intelligence. It is used to enhance the performance and reliability of expert system in the decision making process.

Moreover, the competency mapping process should be performed on a regular basis with minimum user intervention. On the other side, an agent always works proactively on behalf of its users. Therefore, the development of an agent-based expert system for student competency mapping to boost their profiles for better captivation in industry is proposed.

### III. A METHODOLOGY FOR STUDENT COMPETENCY MAPPING

A methodology by integrating an agent-based expert system is proposed to develop for Student Competency Mapping. At present, the plan is to develop the knowledge base for management and engineering students. Later, it will be extended for multidisciplinary (e.g. Science, arts, commerce and many more sub discipline) students.

The system to be developed will consist of a client and server side. The client side application will provide the user interface to receive the input from various users. The user interface will be accessed on the web-based form as well as it will be accessed via handheld devices such as mobile phones. Whereas, the server side application will be responsible for producing the results of competency mapping of the students by applying agent and expert system methodology. Moreover, the system will have three components. These components will be working autonomously and communicated with each other to generate an expert advice to students on their competency level. They are as follows.

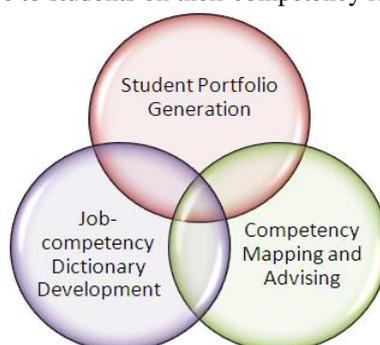


Figure 1: Components of the System

#### A. Components of the System

##### 1. Student Portfolio Generation

In the first phase, student portfolio is developed. For that, at present, three criteria i.e. course curriculum, job interest, competency and its level (e.g. Basic, Advanced, Moderate etc.) are taken for consideration. Portfolio generation is a continuous process that lasts up to the last semester of the students.

To acquire the information for the above said criteria, a questionnaire is to be developed. Moreover, this questionnaire is filled by students as well as faculties. This questionnaire is varied according to the student's course of learning i.e. management, engineering, literature etc. The questionnaire for students consists the questions on his job interest, the various competences he possesses and its level. The competency entered by the students is then after verified by the faculty to finalize the portfolio. As and when the student entered the additional information like getting some certification, carrying some project or training etc., the portfolio would be updated.

##### 2. Job-competency Dictionary Development

This module deals with details regarding the skill set required for each job profile. This data will be provided by the recruiters according the varied job positions. The sample job competency for Web Designer represented by following Table 1.

Table 1. A Sample of Job Competency Dictionary

Competency	Level
Analytical Thinking	Moderate
Communication	Moderate
Database Design & Management	High
Testing	High
Database Design	Moderate
Graphics Design	High
Creativity	High

A dedicated web-based interface to be provided to the recruiters to enter the available job position and the required competency. This job competency dictionary is treated as the knowledge base and it is used by inference engine to map the student profile with required competency.

##### 3. Competency Mapping and Advising

This module performs the inference and reasoning mechanism to map the student competency with available and prospect job positions. It also generates the advice on the acquisition of the required skill set to increase the placement

probability for students. For that, it will be communicated to other two modules: Student Portfolio Generation and job-competency Dictionary Development.

There no human intervention required to generate the advice. An agent is continuously monitors the changes or updates in student's portfolio and the job competency provided by recruiters. Based on these two parameters, it generates the regular advices to the students to acquire the necessary skills to grab the job.

#### **IV. ROLE OF AN AGENT BASED EXPERT SYSTEM**

The agents represent cognitive systems with proprieties, increased autonomy in operation, communication and cooperation capability with other systems and learning capability [1,3,5]. An expert system is a computer system that emulates the decision-making ability of a human expert [4]. It is a piece of software which uses databases of expert knowledge to offer advice or make decisions in such areas as medical diagnosis. Problem domains where generally intelligence possessed by human expert is needed, expert systems have been proved its significance. A rule based expert system is one whose knowledge base contains the domain knowledge coded in the form of rules [7]. A rule based expert system consists the following components: A User Interface, An Inference Engine and A Knowledge base. User Interface is a mechanism to support communication between and the system. The user interface may be a simple text-oriented display or a sophisticated, high resolution display. An inference engine, as the name suggested, infers the knowledge from the knowledge base.

There are two types of inference: forward chaining and backward chaining. Forward chaining is reasoning from facts to the conclusion while backward chaining is from hypothesis to the facts that support this hypothesis [7]. We proposed to use backward chaining as backward chaining is generally used for diagnostic problems. A knowledge base is developed by consulting domain experts.

#### **V. RESULTS AND OUTCOMES**

The system based on the methodology proposed will help students to boost their profiles and skill set for better captivation in the industry. It generates an expert advice for students that will help them to acquire the necessary skill set to get the right placement. The student portfolio will be developed by considering their current curriculum, job interest and skill set they owned. Also, a job-competency dictionary is developed by taking the incumbents to complete a Job Position Information Questionnaire and thus the knowledge base is formed on the basis of job-competency dictionary and human expert knowledge. It then starts to provide suggestions to students about new jobs posted according to their skill set. Also, give them advice to acquire the necessary skill set by examining their portfolio. It identifies necessary skill sets required for a specific job position and help students in a placement activity by mapping student's competency with available job profiles. It also helps faculties to guide the students in the right direction and help them in the acquisition of necessary skill sets.

The system will also be useful for companies to map the competencies required for each job specific role. The system will be accessible at anywhere and anytime and generates expert advice on regular and immediate basis. It will also make the placement activity fast and accurate at some extent.

It is possible to reproduce the knowledge and skills possessed by experts-individuals who are considered to be competence management experts and allow wide distribution of this expertise available at a reasonable cost

#### **VI. CONCLUSION**

A system based on the expert system methodology is proposed to boost students' profiles for better captivation in industry. It has been also observed that, different human experts often provide dissimilar answers to the same problem due to some reasons like poor health, emotional disposition or stress. As the proposed system will be developed as an expert system, it will work consistently in their problem-solving abilities and provides a uniform answer at all times.

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