SkillSync - Bridging the Gap Between Your Skills and Industry Expectations

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Abstract—**The rapid advancement of technology and the continuous evolution of industries have increased the demand for skilled professionals with relevant technical and practical knowledge. However, many students, job seekers, and working professionals face difficulties in identifying the gap between their existing skills and the skills required by industries. This mismatch often leads to reduced employability, difficulties in career planning, and a lack of appropriate learning direction. Hence, to bridge the gap between individual capabilities and industry expectations, the proposed system, SkillSync: Bridging the Gap Between Your Skills and Industry Expectations Using Intelligent Skill Gap Analysis, provides an intelligent approach to skill assessment and career development. The system analyzes the user's existing skills, educational qualifications, experience, and career interests and compares them with the skills required for selected job roles. Using intelligent skill comparison and analysis techniques, the system identifies missing, insufficient, and relevant skills. Based on the analysis, it generates personalized recommendations for suitable learning resources, courses, certifications, and upskilling opportunities. The system can also support skill progress monitoring and reassessment to help users continuously improve their competencies. The main objective of this project is to identify skill gaps, provide targeted learning guidance, improve career readiness, enhance employability, and establish better alignment between individual skills and industry requirements. SkillSync aims to provide a structured and user-friendly solution for students, job seekers, and professionals to make informed decisions regarding their career development and lifelong learning.**

Index Terms—**SkillSync, Intelligent Skill Gap Analysis, Skill Assessment, Industry Requirements, Artificial Intelligence (AI), Skill Matching, Career Development, Personalized Learning Recommendations, Employability, Upskilling, Reskilling, Job Role Analysis, Career Readiness.**

I. INTRODUCTION

In today's modern world, technological advancements and industrial development are continuously changing the requirements of the employment market. The rapid growth of industries such as Information Technology, Artificial Intelligence, Data Science, Cloud Computing, Cybersecurity, and Software Development has increased the demand for skilled and knowledgeable professionals. Organizations are searching for individuals who possess the appropriate technical knowledge, practical experience, problem-solving abilities, and professional competencies. However, many students, job seekers, and working professionals face difficulties in meeting these expectations because of the gap between their existing skills and the skills required by industries. Therefore, identifying and reducing the skill gap has become an important requirement for modern education and career development systems.

A significant number of students complete their academic education without having sufficient practical knowledge or an understanding of current industry requirements. Due to the continuous development of technologies, the skills demanded by employers are changing rapidly. Traditional educational systems may not always update their curricula according to the latest industry trends. As a result, graduates may experience difficulties in obtaining suitable employment opportunities, while organizations may face challenges in finding candidates with the required competencies. This mismatch between academic learning and industrial expectations is commonly known as the skill gap.

In many cases, individuals are unaware of the specific skills required for their desired job roles. They may possess basic knowledge of a particular subject but lack advanced technical skills, practical experience, or

knowledge of modern tools and technologies. For example, a candidate applying for a software development position may have knowledge of programming languages but may require additional skills in database management, software testing, cloud computing, and version control systems. Similarly, a candidate interested in data analytics may require knowledge of Python, SQL, statistical analysis, and data visualization. Without proper guidance, individuals may spend considerable time learning skills that are not directly relevant to their career objectives.

Traditional methods of skill assessment and career guidance generally depend on manual analysis, educational qualifications, interviews, and general recommendations. These methods may not always provide personalized guidance based on an individual's existing abilities and career goals. Comparing personal skills with industry requirements manually can be time-consuming and difficult, especially when job descriptions contain a large number of technical and professional competencies. Therefore, an intelligent and automated system is required to simplify the process of skill assessment and provide appropriate learning recommendations.

The proposed system, SkillSync: Bridging the Gap Between Your Skills and Industry Expectations Using Intelligent Skill Gap Analysis, aims to address these challenges by providing an intelligent approach to skill evaluation and career development. The system analyzes the existing skills of users and compares them with the skills required for their selected job roles. It identifies the skills that are already possessed, the skills that require improvement, and the skills that are completely missing. This comparison helps users understand their current skill levels and determine the competencies they need to develop to meet industry expectations.

The next stage of the procedure is skill gap identification, where the system categorizes the skills according to their availability and relevance. Skills that match the job requirements are identified as existing competencies, while missing or insufficient skills are highlighted as areas for improvement. This analysis helps users understand which skills are important for their career goals and which competencies should be prioritized during the learning process.

After identifying the skill gaps, the system provides personalized learning recommendations. These recommendations may include online courses, tutorials, certifications, practical projects, and other learning resources. The suggested resources are selected according to the identified skill gaps and the user's desired career path. By providing targeted learning guidance, SkillSync helps users focus on relevant competencies rather than following a general learning approach.

Another important feature of the proposed system is skill progress monitoring. Users can update their skill profiles after completing recommended courses, certifications, or practical projects. The system can then perform another skill gap analysis to evaluate the improvement in the user's capabilities. This process supports continuous learning and helps individuals understand their progress toward achieving their career objectives. As industry requirements change, the system can also be extended to incorporate updated skill requirements and revised recommendations.

In conclusion, SkillSync is designed to bridge the gap between existing skills and industry-required competencies through intelligent skill analysis and personalized learning guidance. By identifying missing skills and recommending appropriate learning opportunities, the proposed system aims to improve employability, enhance career planning, and support lifelong learning. The system provides an effective approach for individuals to adapt to changing industry requirements and develop the skills necessary to succeed in the modern employment market.

II. LITERATURE SURVEY

2.1 Duygu Çelik Ertuğrul and Selin Bitirim

Duygu Çelik Ertuğrul and Selin Bitirim presented a systematic literature review on Job Recommender Systems (JRSs), their applications, challenges, and future research directions. The authors reviewed research published between 2010 and 2023 to investigate different recommendation techniques used for matching candidates with job opportunities. The study examined collaborative filtering, content-based filtering, hybrid recommendation, knowledge-based systems, and context-aware recommendation techniques. The authors identified several challenges in existing systems, including recommendation accuracy, algorithmic bias, and limited personalization. The study also highlighted the

importance of integrating intelligent recommendation techniques into career development and recruitment systems. The findings provide useful guidance for developing SkillSync, which aims to analyze individual skills and recommend suitable career development opportunities. <Cite refs={["turn167002search1"]}/>

2.2 Elena Senger, Mike Zhang, Rob van der Goot, and Barbara Plank

Elena Senger, Mike Zhang, Rob van der Goot, and Barbara Plank presented a survey titled "Deep Learning-based Computational Job Market Analysis: A Survey on Skill Extraction and Classification from Job Postings." The researchers investigated the application of Natural Language Processing (NLP) and deep learning techniques for identifying and classifying skills from job advertisements. The study focused on the extraction of technical and non-technical skills from unstructured job descriptions. The authors examined different deep learning methodologies, available datasets, and skill classification techniques. The research also discussed the challenges associated with inconsistent skill terminology and the distinction between hard skills and soft skills. This study is relevant to SkillSync because extracting industry-required skills from job descriptions is an important step in comparing user skills with job requirements. <Cite refs={["turn167002search2"]}/>

2.3 Researchers of A Survey on Skill Identification from Online Job Ads

The researchers presented a systematic survey on skill identification from online job advertisements. The study examined 108 research articles related to identifying skills from job postings and analyzing labor market requirements. The authors investigated different skill databases, skill extraction techniques, application areas, and methods used to classify required competencies. The research highlighted the importance of processing unstructured job advertisement data to identify the skills demanded by employers. It also discussed challenges related to skill identification, including the representation of skills, differences in terminology, and the level of detail required for accurate analysis. The study provides a foundation for SkillSync by demonstrating the importance of analyzing industry job requirements to identify relevant competencies and skill gaps. <Cite refs={["turn167002search9"]}/>

2.4 Researchers of Job Description Parsing with Explainable Transformer-Based Ensemble Models

The researchers introduced an explainable transformer-based ensemble model for extracting technical and non-technical skills from job descriptions. The proposed approach combined traditional machine learning and transformer-based neural network techniques to identify important competencies required for different IT job roles. The researchers developed an annotated dataset covering 22 IT roles and evaluated the performance of their proposed model. The results showed improved skill extraction performance compared with conventional Conditional Random Fields (CRF) and hybrid deep learning models. The study also incorporated Local Interpretable Model-Agnostic Explanations (LIME) to improve the interpretability of the model's predictions. This research is useful for SkillSync because it demonstrates how NLP and machine learning can be applied to analyze job descriptions and extract the skills required for specific career paths. <Cite refs={["turn167002search4"]}/>

III. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement

SkillSync aims to identify the gap between an individual's existing skills and the skills required by a selected job role or industry. Traditional career guidance methods may not provide a clear and personalized assessment of the skills needed for a particular career. As a result, students and job seekers may find it difficult to understand which skills they need to improve to meet industry expectations.

The proposed system analyzes the user's skills, education, and career interests, compares them with the requirements of the selected job role, and identifies matching, insufficient, and missing skills. It then provides suitable learning recommendations to help users improve their skills and prepare for industry requirements.

B. Objectives

1. To analyze the existing skills and qualifications of users.
2. To identify the skill gap between users' current

skills and industry requirements.
3. To compare user skills with the skills required for a selected job role.
4. To recommend relevant courses, tutorials, and learning resources to improve missing skills.
5. To help students and job seekers prepare for industry expectations and career opportunities.

IV. PROPOSED METHODOLOGY

A. Phase 1: Data Collection and Preprocessing

The first phase involves collecting data about users' skills, education, experience, and career interests. Job descriptions and industry requirements are also collected to identify the skills expected for different job roles. The collected data is cleaned, organized, and preprocessed to remove inconsistencies and prepare it for skill analysis.

B. Phase 2: Skill Extraction and Analysis

The system analyzes the user's profile to identify their existing skills. It also processes job-role requirements to determine the technical and non-technical skills expected by the industry. The extracted skills are organized into a structured format so that the user's current skills can be compared with the required skills.

C. Phase 3: Intelligent Skill Gap Identification

The system compares the user's existing skills with the skills required for the selected job role. Based on this comparison, it identifies skills that match the requirements, skills that need improvement, and skills that are missing. This analysis helps users understand the areas where they need to develop their knowledge and abilities.

D. Phase 4: Personalized Learning Recommendations

In the final phase, the system provides suitable learning recommendations based on the identified skill gaps. These may include courses, tutorials, certifications, and practical projects related to the missing or insufficient skills. The recommendations help users create a learning path and improve their readiness for the selected job role.

V. SYSTEM ARCHITECTURE

The system architecture of the proposed project, "SkillSync: Bridging the Gap Between Your Skills and Industry Expectations Using Intelligent Skill Gap Analysis," represents the overall structure and working process of the system. The proposed system uses user profile data, skill extraction, job-role requirements, skill gap analysis, and personalized learning recommendations. Each module performs a specific function, starting from collecting user information to recommending learning resources that help users meet industry expectations.

A. User Profile and Data Collection

The first stage involves collecting information about the user, including existing skills, educational qualifications, experience, and career interests. The user selects a job role or industry they want to pursue. The system also uses job descriptions and industry requirements to identify the skills expected for the selected role.

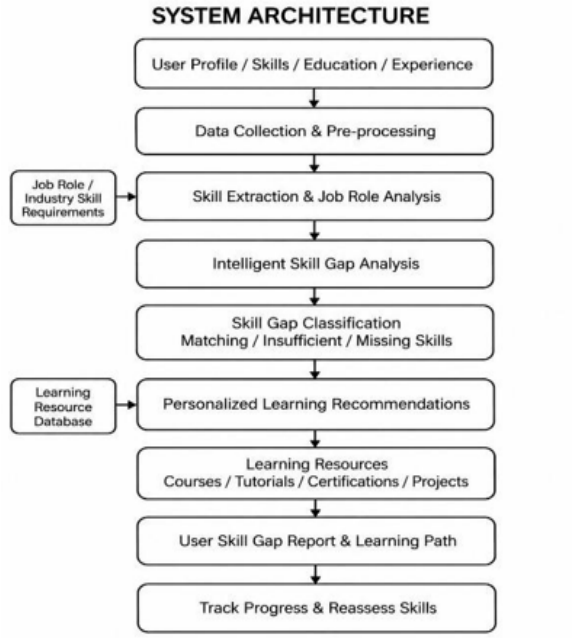

Fig. 1. Architecture of the SkillSync Intelligent Skill Gap Analysis System.

B. Skill Extraction and Job-Role Analysis

In the second stage, the system analyzes the user's profile and extracts the skills they already possess. It also analyzes the selected job role to identify the required technical and non-technical skills. The extracted information is organized into a structured format to support accurate comparison between the user's current skills and industry expectations.

C. Intelligent Skill Gap Identification

After extracting the skills, the system compares the

user's existing skills with the skills required for the selected job role. The comparison identifies three categories: matching skills, skills that need improvement, and missing skills. The system generates a skill gap report that highlights areas where the user needs further learning or practice.

E. Personalized Learning Recommendations

The final stage involves generating learning recommendations based on the identified skill gaps. The system suggests relevant courses, tutorials, certifications, and practical projects to help users improve their skills. These recommendations help users prepare for the selected job role and develop a learning path aligned with industry requirements.

Entity	Key Attributes / Description
User Profile	Stores user details, education, experience, and career interests.
Skill Database	Contains skill names and related skill categories.
Job Role	Stores job titles and descriptions of the selected career roles.
Job Skill Requirements	Contains skills expected for a particular job role or industry.
Skill Extraction	Identifies skills from user profiles and job descriptions.

Table I. Main Entities of the Data Model

VI. IMPLEMENTATION OF THE INITIAL VERSION

The initial version of the proposed system focuses on developing an intelligent skill gap analysis platform using data processing and intelligent skill-matching techniques. The main objective is to analyze users' existing skills, compare them with the requirements of a selected job role, and recommend suitable learning resources to improve their career readiness.

The implementation begins with collecting user information such as skills, educational qualifications, experience, and career interests. Job-role requirements are also prepared in a structured format. The collected data is cleaned and organized to ensure consistency during the analysis process.

The system then identifies the user's existing skills and compares them with the skills required for the selected job role. Based on this comparison, it determines matching skills, insufficient skills, and missing skills. The results are presented in a skill gap report that helps users understand their current skill level and the areas requiring improvement.

Finally, the system recommends relevant courses, tutorials, certifications, and practical projects according to the identified skill gaps. The initial implementation can be tested using different user profiles and job roles to evaluate whether the system identifies skill gaps correctly and provides relevant learning recommendations.

VII. EXPECTED RESULTS AND DISCUSSION

The expected result is that the SkillSync system will successfully identify the skill gap between a user's existing skills and the skills required for a selected job role. The system will analyze the user's profile and compare it with industry skill requirements. It will classify skills as matching, insufficient, or missing. This automated analysis will reduce the need for manual skill assessment and help users understand the skills they need to improve.

Table II

Test Scenario	Expected System Response
User Profile Submission	Accepts and analyzes user details, education, experience, and existing skills.
Job Role Selection	Identifies the skills and qualifications required for the selected job role.
Skill Matching	Identifies skills that match the selected job role requirements.
Missing Skill Identification	Detects skills that are not present in the user's profile but are required for the job role.
Skill Gap Report	Displays matching, insufficient, and missing skills in an understandable format.

Expected Results of the Proposed SkillSync System

After identifying the skill gaps, the system is expected to generate personalized learning recommendations. These recommendations may include relevant courses, tutorials, certifications, and practical projects that help users improve their knowledge and abilities. The system will present the results through a skill gap report and a suggested learning path. This will help students and job seekers understand their current skill level, focus on areas requiring improvement, and prepare more effectively for their desired job roles.

VIII. CONCLUSION AND FUTURE SCOPE

A dataset will be prepared to train and evaluate the SkillSync system. The dataset will contain user skill profiles, educational qualifications, experience, job roles, and industry-required skills. The application will use this data to compare the skills possessed by users with the skills expected for selected job roles. Based on the comparison, the system will identify matching, insufficient, and missing skills. A suitable dataset will help improve the accuracy and reliability of skill gap analysis and personalized learning recommendations.

In the future, the system can be enhanced by integrating AI-based skill extraction and advanced semantic matching techniques to understand skills mentioned in different formats. The dataset can be expanded with more job roles and updated industry requirements to improve the system's usefulness. Additional features such as progress tracking, personalized career paths, and periodic skill reassessment can also be introduced. These enhancements can help SkillSync provide more accurate recommendations and support users in preparing for changing industry expectations.

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