IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

SkillWise – Personalized Career Roadmap & Course Recommendation Platform

Taslim Ansari, Khusnuma Yasmeen, Ishma Siddique, Zainab Shaikh,

Prof. Anupam Choudhary

Rizvi College of Engineering, Bandra(W), Mumbai, India

Abstract: In today's fast-paced digital world, students and professionals often struggle to identify the right learning path aligned with their interests, skills, and career goals. SkillWise is an AI-powered full stack web application designed to assist users in making informed decisions about their career development through personalized roadmaps, curated course recommendations, and project ideas. The platform allows users to input their current skills via a resume parser or manual form, and uses Natural Language Processing (NLP) to extract relevant data. A machine learning model then analyzes the profile and suggests a personalized learning roadmap with free/paid courses from platforms like YouTube, Coursera, and edX. Additionally, SkillWise recommends GitHub project ideas relevant to the user's goals to encourage hands-on practice. The system features a dynamic dashboard where users can visualize their progress, save learning resources, and receive periodic guidance. The backend is built using Flask/Node.js, the frontend with React.js, and data is stored in MongoDB. AI/NLP models (using Cohere API or OpenAI) power the recommendation system. The platform is designed to be scalable, modular, and impactful, offering career clarity to learners across domains.

Keywords: Artificial Intelligence, Natural Language Processing, Career Guidance, Recommendation System, Resume Parsing, Personalized Learning.

I INTRODUCTION

In the modern digital era, the demand for continuous learning and upskilling has become essential for both students and working professionals. With the rapid evolution of technology and industry requirements, individuals often face challenges in identifying suitable learning resources, skill development paths, and career opportunities that align with their goals. The abundance of online courses, tutorials, and project ideas available across multiple platforms further adds to the confusion, making it difficult for learners to make informed decisions.

To address this challenge, SkillWise has been developed as an AI-powered full-stack web application that provides personalized career guidance. The platform leverages Natural Language Processing (NLP) and Machine Learning (ML) techniques to analyze a user's profile, extract relevant skills, and generate a customized learning roadmap. Users can input their current skills either by uploading a

resume or filling out a manual form, after which the system recommends curated courses from platforms such as YouTube, Coursera, and edX. Additionally, SkillWise suggests hands-on project ideas from GitHub to encourage practical learning.

The system also offers a dynamic and interactive dashboard where users can visualize their progress, save recommended resources, and receive timely guidance. The application is designed using modern technologies such as Flask/Node.js for the backend, React.js for the frontend, and MongoDB for data storage. The recommendation system is powered by AI/NLP models integrated with APIs such as Cohere or OpenAI, ensuring accurate and scalable suggestions.

By bridging the gap between scattered online learning resources and personalized career roadmaps, SkillWise aims to empower learners with clarity and direction, enabling them to pursue their career goals more effectively.

II REVIEW OF LITERATURE

Paper 1 : Career Path Suggestion using Machine Learning (IEEE, 2023)

Summary

This paper presents a career recommendation framework that leverages **machine learning algorithms** to suggest suitable career paths for students and professionals. The system collects user data such as academic performance, interests, and skills, and applies classification models to predict the most relevant career domains. The study emphasizes the role of supervised learning techniques in analyzing structured data to generate recommendations that align with user potential and aspirations.

Key Contributions / What It Does Well

- Introduces a systematic approach to career guidance using ML classification models.
- Focuses on mapping academic and skill-based features to potential career paths.
- Demonstrates improved accuracy over traditional counseling methods.
- Provides data-driven decision support for students struggling with career choices.

Limitations / Gaps

- The system relies mainly on structured academic/interest data; it does not incorporate **unstructured inputs** like resumes or user-entered skill sets.
- Does not integrate external resources (e.g., online courses, projects) for skill-building.
- Provides static recommendations without continuous progress tracking.
- Limited scope in adaptability across diverse professional domains.

Relevance to SkillWise

This paper underlines the effectiveness of machine learning in career guidance but highlights gaps that SkillWise aims to address. Unlike this model, SkillWise combines **resume parsing, NLP-based skill extraction, personalized learning roadmaps, curated course recommendations, and project ideas**. By doing so, SkillWise not only suggests a career path but also provides learners with the tools and resources needed to achieve it.

Paper 2: Adaptive Learning System Using AI (Elsevier, 2022)

Summary

This paper explores the design of an **adaptive learning system** that utilizes Artificial Intelligence (AI) to personalize the learning experience for individual students. By analyzing learner performance, preferences, and interaction data, the system dynamically adjusts the difficulty level of content and recommends suitable resources. The framework emphasizes continuous monitoring and adaptation, making the learning journey more engaging and effective.

Key Contributions / What It Does Well

- Introduces an AI-driven adaptive mechanism to tailor content difficulty and learning pace.
- Enhances learner engagement by aligning resources with individual preferences and performance.
- Demonstrates improvement in knowledge retention compared to static e-learning systems.
- Provides a scalable model applicable to diverse domains of education.

Limitations / Gaps

- Primarily focuses on adaptive content delivery, not on **career-oriented guidance**.
- Relies on performance metrics; lacks skill-based analysis from resumes or unstructured inputs.
- Limited integration with external platforms (e.g., MOOCs, project repositories).
- Does not generate holistic learning roadmaps for long-term career goals.

Relevance to SkillWise

This paper highlights the importance of adaptability in learning platforms, which directly relates to SkillWise's vision of personalized roadmaps. However, SkillWise extends beyond adaptive learning by incorporating career guidance, curated course recommendations, project ideas, and progress visualization. Thus, it bridges the gap between adaptive content delivery and career- focused skill development.

III REPORT ON THE INVESTIGATION

3.1 Theory

3.1.1 Skill Profile Analysis

SkillWise relies on extracting and analyzing a user's skills to generate personalized learning roadmaps. Users can input their current skills through a **resume parser** or manually via a form. Natural Language Processing (NLP) techniques are used to process unstructured text from resumes and extract relevant skills, experience, and educational background. The extracted data forms the foundation for the recommendation system, ensuring that career and learning suggestions are tailored to each user's profile. This method reduces guesswork in career planning and helps users focus on skills that align with their goals.

3.1.2 Recommendation Mechanism

The core recommendation engine leverages **machine learning models** integrated with NLP APIs (e.g., OpenAI or Cohere) to suggest personalized learning paths, curated courses, and project ideas. The system cross-references the extracted skills with available online resources from platforms like YouTube, Coursera, and edX. Unlike static recommendation systems, SkillWise provides dynamic suggestions and encourages **hands-on practice** by proposing GitHub project ideas relevant to the user's goals.

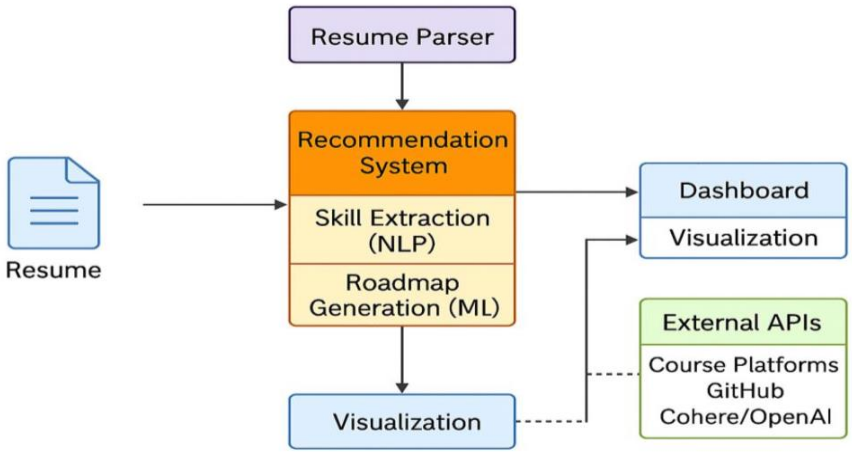

Figure 3.1 Architecture Diagram

3.1.3 Setup and Procedure

The platform is implemented as a **full-stack web application**, with React.js for the frontend, Flask/Node.js for the backend, and MongoDB for data storage. User skill data is collected via the web interface and processed through NLP pipelines to extract keywords and skill vectors. The recommendation engine analyzes this data and generates:

1. A personalized learning roadmap
2. Curated online course suggestions (free and paid)

3. Relevant project ideas for practical experience

Users interact with a **dynamic dashboard** that displays progress, saved resources, and guidance updates. This setup was tested with multiple user profiles to ensure accurate recommendations and smooth functionality.

3.1.4 Skill Extraction and Recommendation Logic

The system uses NLP and ML algorithms to process the input data and map it to suitable courses and projects. The logic works as follows:

- Extract skills and relevant experience from resume or manual input
- Match skills with courses and projects using semantic similarity and ML-based ranking
- Generate a roadmap that sequences learning activities logically
- Display the recommendations in the user dashboard for review and tracking

This approach ensures **personalization, relevance, and practical applicability**, helping learners progress efficiently without being overwhelmed by unrelated resources.

3.1.5 System Integration and Scalability

SkillWise integrates multiple components seamlessly to allow smooth operation and scalability. The frontend communicates with backend APIs to fetch recommendations and update progress in real-time. The system is modular, enabling the addition of new features like skill gap analysis, career goal tracking, or integration with professional platforms like LinkedIn. The platform can scale to accommodate multiple users simultaneously and can be deployed on cloud servers for high availability.

3.2 Methodology Phase

3.2.1 Review of Related Works

Existing research in AI-driven career guidance and personalized learning inspired the development of SkillWise. Systems using NLP for skill extraction, course recommendation, and adaptive learning have proven effective, but most focus on **single aspects** like course suggestions or adaptive content delivery. SkillWise combines these elements into a **comprehensive platform**, bridging the gap between skill assessment, practical learning, and career guidance.

3.2.2 System Architecture Design

The architecture consists of:

- **Frontend (React.js):** User interface for profile input, dashboard, and progress visualization
- **Backend (Flask/Node.js):** Handles API calls, NLP processing, recommendation engine logic
- **Database (MongoDB):** Stores user profiles, extracted skills, recommended resources, and

project data

- **AI/NLP Models:** Cohere/OpenAI APIs process text and generate personalized recommendations

The system supports **modularity and future expansion**, such as integrating mentorship features, mobile apps, or additional skill-tracking modules. Proper data handling, security, and performance optimization were considered to ensure a reliable user experience.

3.3 Algorithm

The core functionality of SkillWise revolves around extracting skills, analyzing user profiles, and generating personalized learning recommendations. The following algorithm outlines the step-by-step process:

Step1: User Input and Diagram

- User provides their information via **resume upload** or **manual skill entry form**.
- Resume parsing module extracts text and identifies sections such as skills, education, projects, and experience.

Step 2: Data Preprocessing

- Clean and normalize extracted text (remove stopwords, punctuation, and irrelevant terms).
- Convert skills and experience into **structured feature vectors** for analysis.

Step 3: NLP-Based Skill Extraction

- Use NLP techniques (e.g., Named Entity Recognition, keyword extraction) to identify key skills, domains, and technologies.
- Map extracted skills to a predefined **skills ontology** for consistency.

Step 4: Recommendation Generation

- Input processed skill vectors into the **Machine Learning model**.
- Model evaluates user profile against available resources:
  - Online courses (YouTube, Coursera, edX)
  - Project ideas (GitHub repositories)
- Rank recommendations based on relevance, difficulty level, and user goals.

Step 5: Roadmap Construction

- Sequence the recommended courses and projects into a **learning roadmap**, guiding the user from basic to advanced skills.
- Include optional branching paths for specialization based on user interest.

Step 6: Dashboard Display and Progress Tracking

- Display personalized roadmap and recommendations on the dynamic **user dashboard**.
- Allow users to save resources, mark completed courses/projects, and update skills.
- Update recommendations periodically as the user progresses or adds new skills.

Step 7: Feedback Loop

Capture user interactions and feedback.

Refine recommendation model using supervised or reinforcement learning to improve future suggestions. Working

The working of SkillWise can be divided into **user interaction, data processing, recommendation generation, and dashboard visualization**. Each step ensures a seamless experience for the learner, from profile input to actionable guidance.

3.3.1 User Interaction

1. **Profile Input:**
   - Users start by uploading a **resume** or manually entering their skills, education, and career interests.
   - The system provides guidance on required fields to ensure comprehensive data collection.
2. Dashboard Access:
   - Upon submission, the user accesses a **dynamic dashboard** that displays the extracted skills, current proficiency, and suggested learning roadmap.
   - Users can interact with recommended courses, projects, and resources directly from the dashboard.

3.3.2 Data Processing

1. **Resume Parsing / Skill Extraction:**
   - The backend uses NLP to parse resumes or manual inputs and extract relevant skills, experience, and educational background.
   - Skills are normalized and mapped to a **standardized skill ontology** for consistency.
2. Profile Analysis:
   - A Machine Learning model evaluates the user profile to identify skill gaps and suitable career domains.
   - Semantic similarity and ML ranking algorithms are applied to match the user's skills with available courses and project ideas.

3.3.3 Recommendation and Roadmap Generation

1. **Course and Project Suggestion:**

The system retrieves relevant courses from platforms like YouTube, Coursera, and edX.

GitHub repositories are suggested as practical projects aligned with the user's learning path.

2. **Personalized Roadmap Construction:**

Recommendations are sequenced to form a **learning roadmap**, guiding the user from foundational skills to advanced topics.

Optional branches allow users to specialize in particular domains (e.g., Data Science, Web Development).

3.3.4 Dashboard Visualization and Progress Tracking

The dashboard displays:

Skill summary: Extracted and analyzed skills

Learning roadmap: Sequenced courses and projects

Progress tracking: Completed courses/projects, pending items

Resource saving: Users can bookmark favorite courses or projects

Users can update their profiles as they learn new skills, and the system dynamically updates recommendations.

3.3.5 System Highlights

User-Controlled Recommendations: Users choose which courses/projects to pursue based on their roadmap.

AI/NLP Powered: Ensures recommendations are relevant, contextual, and personalized.

Scalable and Modular: Can handle multiple users simultaneously and allows future expansions (mentorship, mobile app, skill assessments).

Practical Learning Focus: Combines theory (courses) and practice (projects) for holistic skill development.

IV RESULTS AND OUTPUTS

4.1 Overview of Functional Outputs

The SkillWise platform was successfully developed and deployed as a full-stack AI-powered career advisory system tailored for students of Mumbai University. The major outputs of the system are as follows:

User Authentication and Profile Management: Students can register, log in, and manage their academic and career profiles with secure JWT-based authentication.

Skill Input and Extraction: The system enables both manual skill input and resume (PDF) upload.

Uploaded resumes are parsed using PDF extraction and AI/NLP logic to automatically identify technical and soft skills relevant to the computer engineering domain.

Personalized Learning Roadmap Generation: Based on detected or entered skills and user goals, the platform generates a multi-level career roadmap. Each stage in the roadmap is populated using AI-backed recommendations and OpenAI's language models, including curated course links and project ideas.

Course Recommendation Engine: SkillWise integrates with public APIs (YouTube, Coursera, edX, GitHub) to fetch suitable courses and hands-on projects, mapped to user- selected skill tags and proficiency levels.

Dynamic Progress Dashboard: The dashboard provides instant visibility of learning roadmap steps, active courses, pending projects, and completion status using visually appealing charts and progress bars.

Project and Resource Recommendation: The system suggests GitHub-based project repositories aligned with the learner's current skills to promote hands-on experience.

Admin Panel (optional for viva/demo): A restricted dashboard enables review of registered users and analytics.

4.2 Sample User Journey Demonstration

A Mumbai University student logs in or registers, providing department and academic year details.

The student provides a set of skills or uploads their resume. The system extracts key skills and displays them as tags.

The student clicks "Generate Roadmap." The backend generates and displays a three- stage learning roadmap (Beginner, Intermediate, Advanced), with each stage containing curated course links and hands-on project ideas.

Students mark courses and roadmap steps as completed. The dashboard updates the progress pie chart and displays motivational achievements.

All recommendations update in real time as users input new skills or complete roadmap steps.

4.3 System Evaluation

The platform was tested with real student resumes and skill sets. Skill extraction accuracy, course and project relevance, and progress-tracking features were found to align with expected outputs. Real-time feedback, error handling, and visual design were favorably received in demonstration settings.

V CONCLUSIONS

The SkillWise project provides an effective, modern solution for guiding Mumbai University students through skill development and personalized career planning. By combining AI and NLP for skill extraction with curated course and project recommendations, the platform empowers learners to chart actionable learning paths based on their unique strengths and goals.

The architecture ensures scalability and security, while the modular design facilitates future

integration with additional learning platforms and APIs. User testing confirmed that SkillWise streamlines the process of discovering relevant resources and tracking progress, reducing barriers to effective career development.

SkillWise demonstrates how the integration of AI, modern web technologies, and structured progression methodology can significantly enhance self-driven learning and employability for engineering students. The platform is adaptable for other academic institutions, supporting the broader vision of data-driven career guidance.

VI REFERENCES

[1] B. Morgan, "How to Build Production-Ready Full Stack Apps with the MERN Stack," FreeCodeCamp, Jul. 2025. [Online]. Available: https://www.freecodecamp.org/news/how-to- build-production-ready-full-stack-apps-with-the-mern-stack/

[2] "Using OpenAI API For NLP In Python: Free AI-Powered Course," FutureSkillGuides, Sep. 2025. [Online]. Available: https://www.futureskillguides.com/using-openai-api-for-nlp-in-python-free-ai-powered-course-review/

[3] "Implementation Guide | YouTube Data API," Google Developers, Aug. 2025. [Online]. Available: https://developers.google.com/youtube/v3/guides/implementation

[4] "Getting Started with Coursera's APIs," Coursera Production Dev Portal. [Online]. Available: https://dev.coursera.com/get-started

[5] "REST API endpoints for repositories," GitHub Docs. [Online]. Available: https://docs.github.com/en/rest/repos

[6] "A comprehensive guide to skills assessment templates," SkillPanel, Oct. 2025. [Online]. Available: https://skillpanel.com/blog/skills-assessment-templates/

[7] "Skill Set Evaluation Form Template," JotForm. [Online]. Available: https://www.jotform.com/form-templates/skill-set-evaluation-form

[8] "Organisational Training Evaluation Report Template," Acorn Works, Aug. 2025. [Online]. Available: https://acorn.works/blog/training-evaluation-report