Synopsis Report

On

**Course Recommendation System**

Submitted

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**PROBLEM STATEMENT**

Students in colleges and online learning platforms are inundated with courses across a variety of subjects. Many times, they find it hard to figure out which courses are correct as per their interests, career ambitions and academic experience. This inevitably causes many students to make misguided course choices that do not play to their strengths or future ambitions, and consequently resulting in frustration, wasted time and effort.

This becomes a problem or challenge not only for students but also for educational institutions that desire to create personalized learning experiences for their students and wish to help their students make better-informed choices. The traditional, old-school way of providing course and class selection to students —via those course catalogs or generic advice — doesn’t offer students personalized options based on their academic performance, preferences, and future goals.

To solve this problem we need a Course Recommendation System that will:

* Trails to success—Match students with their individual preferences
* Course match-making with students’ profiles: Recommend suitable courses based on previous studies, interest areas and career goals.
* Enable Students to Make Informed Choices: Go beyond just listing courses and apply filtered/sorted recommender systems that include course details (e.g., prerequisites, course load, etc.) to enable students to make informed decisions with confidence.

Ultimately, the goal of the Course Recommendation System is to make course selection easier, more personalized, and more aligned with each student’s educational journey, enabling them to succeed in their studies and their future careers.

**OBJECTIVE OF THE STUDY**

The objective of this research work is to design a Course Recommendation System which is leveraged to allow students to choose better course pertaining to individual needs and career development. The overall specific objectives of this study are:

1. Furthermore, a primary objective is to provide students with relevant, well-informed, and clear course options to support their decision-making. This allows students to feel more confident about their decision-making and reduces the chances of students choosing
2. To Generate Personalized Course Recommendations: The objective of this study is to develop a system that will help the students by providing suggestions for courses based on their profiles and would correlate them with the specific courses. However, this is in reality common practice, even so, only until the path of courses has already been collectively taken.
3. To Knowledge their Preferences: Collecting and analysing the knowledge in their educational, skilled, and performance on previous topics in regard to their learning types. This helps the system to recognize what might be courses of interest
4. To Use Advanced Algorithms for Accurate Suggestions: The study intends to explore and apply advanced recommendation algorithms (such as content-based filtering) to ensure that the course recommendations are as accurate and relevant as possible. These algorithms will analyze both the courses suitable for te children by describing the price of the course, link to redirect directly to the main web site and total number of students already enrolled.

This objective section emphasizes the benefits for students and the practical approach for developing a personalized and effective course recommendation system.

**INTRODUCTION**

With the rapid expansion of online learning platforms, students now have access to thousands of courses, making it increasingly difficult to choose the ones best suited to their interests and career goals. The overwhelming variety of options often leads to confusion, ineffective decision-making, and wasted time on courses that may not align with a student’s aspirations. To address this challenge, our project introduces a Course Recommendation System using the Udemy dataset which contains all the courses paid as well as free. The system is designed to simplify the course selection process by providing personalized suggestions based on a student’s academic background, interests, and learning preferences.

A key highlight of our system is the integration of NPTEL (National Program on Technology Enhanced Learning) courses, a prestigious initiative by IITs and IISc that offers high-quality educational content in various disciplines, including engineering, science, humanities, and management. By incorporating NPTEL courses, our system ensures that students receive credible, structured, and academically enriching recommendations, helping them access top-tier educational resources for skill enhancement and career growth. These courses not only provide in-depth subject knowledge but also offer certification opportunities that add value to a student’s academic profile.

The recommendation engine functions by analyzing multiple factors such as past coursework, subject interests, skill levels, and career goals. It employs intelligent algorithms to generate customized course suggestions, ensuring that students receive recommendations tailored to their specific needs. Unlike generic course listings, our system dynamically updates recommendations based on user interactions and learning progress, providing a more adaptive and personalized experience.

With education becoming increasingly digital and skill-based, students need an efficient way to navigate through vast learning opportunities. Our Course Recommendation System not only simplifies course discovery but also encourages continuous learning, ensuring that students enroll in courses that align with their aspirations and industry demands. By leveraging technology, data-driven insights, and high-quality resources like NPTEL, this project aims to revolutionize the way students explore and select courses, making learning more accessible, relevant, and impactful.

**HARDWARE & SOFTWARE REQUIREMENTS**

To develop and run the Course Recommendation System efficiently, a combination of suitable hardware and software resources is required. These requirements ensure that the system operates smoothly, processes data effectively, and delivers accurate recommendations to users.

Hardware Requirements

To handle data processing, algorithm execution, and a seamless user experience, the following hardware specifications are recommended:

* Processor: A multi-core processor such as Intel Core i5/i7 or AMD Ryzen 5/7 is preferred for smooth computation and faster execution of recommendation algorithms.
* RAM: At least 4 GB of RAM is required for efficient data handling, while 16GB or higher is recommended for enhanced performance, especially when dealing with large datasets.
* Storage: A minimum of 256GB SSD is necessary to store system files, datasets, and software dependencies. An SSD is preferred over HDD to ensure faster data retrieval and system responsiveness.
* Graphics Processing Unit (GPU) [Optional]: If the system incorporates machine learning models, a dedicated GPU such as NVIDIA GTX 1650 or higher can help accelerate computations.
* Internet Connectivity: A stable internet connection is required for fetching course data, particularly for integrating NPTEL courses and other online resources.

Software Requirements

The software stack plays a crucial role in building, deploying, and running the Course Recommendation System efficiently. The essential software components include:

* Operating System: The system can be developed on Windows (10/11), macOS, or Linux (Ubuntu 20.04+), depending on the developer’s preference. Linux is often preferred for seamless integration with backend technologies.
* Programming Language: Python is the primary programming language due to its rich ecosystem of libraries for data analysis, machine learning, and web development.

By utilizing the right combination of hardware and software resources, the Course Recommendation System ensures optimal performance, scalability, and a smooth user experience, making course discovery more efficient and personalized for students.

**LITERATURE REVIEW**

1. The paper "Recommendation Systems with Complex Constraints: A Course Recommendation Perspective" [1] by Jinjiao Lina, et al explores advanced methodologies for course recommendations that go beyond simple requirement checking. The authors highlight a gap in existing systems, which often fail to provide effective course suggestions while ensuring students meet graduation requirements. The study examines algorithmic approaches such as greedy methods and Integer Linear Programming (ILP), with a particular focus on max-flow and min-cost max-flow techniques. Their evaluation, conducted on real student data, reveals that while ILP offers slightly superior recommendations, it is computationally intensive, whereas simpler flow-based methods still enhance recommendation quality significantly.
2. The paper "Using Recommendation System in course management systems to recommend Learning Objects" [2] by Jamil Itmazi and Meguel Megias explores the role of fuzzy logic in enhancing course recommendation systems to assist students in making informed academic decisions. The study emphasizes the importance of course selection, highlighting the difficulties students face due to limited knowledge of available options, which necessitates an intelligent recommendation system. The authors introduce fuzzy logic as a key approach, as it mimics human reasoning to handle uncertainty and complexity in decision-making. The fuzzification process converts student inputs, such as skills and interests, into fuzzy values, categorizing them into relevant domains like programming and problem-solving.
3. The paper "Course Recommendation System Using Fuzzy Logic Approach" [3] by Mohd Suffian Sulaiman, et al explores the role of recommender systems (RSs) in enhancing e-learning experiences, particularly in Learning Management Systems (LMS). It categorizes RSs into content-based, collaborative filtering, demographic-based, and hybrid models, each offering unique benefits in course recommendations. The study highlights how hybrid systems combine multiple techniques to improve accuracy, making them particularly effective in dynamic educational settings. Additionally, it emphasizes the growing need for innovative algorithms to better personalize learning experiences. Overall, the research underlines the importance of RSs in guiding students toward suitable courses, ultimately improving academic outcomes.
4. The paper "Course Recommendation System Based on Grades"[4] by Bhaskar Mondal examines how academic performance can be leveraged to improve course recommendations. It discusses collaborative filtering as a traditional approach while highlighting its challenges, such as data sparsity and cold-start issues. The study explores machine learning techniques like K-means clustering and frequent pattern mining to enhance recommendation accuracy. Hybrid models integrating collaborative filtering with machine learning methods, including non-negative matrix factorization and cosine similarity, further refine suggestions. Overall, the research emphasizes that machine learning significantly improves course recommendations, with future potential in deep learning for real-time personalization.
5. The paper "An Automated Recommender System for Course Selection" [5] by Jamal Alsakran explores various recommender system approaches to assist in personalized course selection. It reviews collaborative filtering, content-based filtering, and knowledge-based systems, as well as hybrid models that combine multiple techniques for improved accuracy. The study introduces association rule mining to identify patterns in course selection, helping to tailor recommendations based on historical student data. The paper also highlights challenges in the field, such as the cold start problem and data sparsity. It concludes by emphasizing the potential of deep learning and hybrid models in advancing recommendation systems for education.

**THE EXPECTED OUTCOME OF THE PROJECT**

The Course Recommendation System aims to provide students with personalized course suggestions based on their academic interests, learning preferences, and career goals. The system is designed to enhance the learning experience by offering curated recommendations from udemy courses as well as NPTEL courses and providing essential course details to help users make informed decisions.

Key Outcomes of the Project:

Personalized Course Recommendations

The system will allow users to input their field of interest and specify how many course recommendations they would like to receive.

Based on the selected domain (e.g., Data Science, Machine Learning, Web Development, etc.), the system will filter and suggest the most relevant courses.

Comprehensive Course Details

Each recommended course will be displayed along with essential information, including:

Course Name – Title of the course.

Course Link – A direct link to the course page for easy access.

Course Price – Whether the course is free or paid, along with pricing details if applicable.

Number of Enrolled Students – Displaying how many students have already taken the course to indicate its popularity and credibility.

User-Friendly Interface

Instead of manually searching for courses, students will receive tailored suggestions, saving time and effort.

The inclusion of NPTEL courses ensures access to high-quality, government-certified educational content, making the recommendations both useful and credible.

Overall, the Course Recommendation System will serve as a personal learning assistant, simplifying the process of discovering and selecting courses that align with a student’s academic and professional growth. By integrating crucial course details, the system enhances transparency and usability, helping students make well-informed choices in their learning journey.

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* An Automated Recommender System for Course Selection[5] - Jamal Alsakran

1. **Web Resources & Online Platforms:**

* Kaggle (<https://www.kaggle.com/>)
* NPTEL (<https://nptel.ac.in/>)
* Udemy (<https://www.udemy.com/>)
* Google Scholar (<https://scholar.google.com/>)