

PUNE INSTITUTE OF COMPUTER TECHNOLOGY

(DHANKAWADI, PUNE-43)



PROJECT REPORT ON

“AI Assisted Web Learning Infrastructure” in collaboration with

Dassault Systèmes

SUBMITTED BY

Chetan Chaku (4923)

Junaid Magdum (4945)

Ritesh Ghorse (4930)

(Fourth Year Information Technology)

UNDER THE GUIDANCE OF

Prof. S. B. Deshmukh

Submitted To

Pune Institute of Computer Technology

For Academic Year 2017-18

Problem Statement:

To apply Machine Learning concepts for the field of E-Learning search as Smart Content, Smart Search, NLP, Learning Profiling, etc. To demonstrate the application of all conducted research and concepts into a workable POC web app.

Project Details:

1. Identification of Machine Learning Algorithms
 - a. Support Vector Machine
 - b. K Means Clustering
 - c. Decision Tree
 - d. Linear and Logistic Regression
 - e. Artificial Neural Networks
2. Exploration of Deep Learning Architectures
3. Application of Programming Languages
 - a. Python
 - b. JavaScript
 - c. Node.js
4. Implementation of Individual Use-Cases
5. Integration of all Use-Cases into one Web Application

Three Main Use-Cases for AI Project Work:

1. Chatbots
2. Search Customization
3. Recommendation Systems

1. CHATBOTS

This project involved the development of a Chatbot for customer service needs such as real-time querying and automated answering. Chatbot acts as a trained assistant that can provide learners with answers and guidance. There was a need for Live Natural Processing in the Chatbot.

Development Methodology:

- a. A neural network(8x8) is trained based on the possible conversation users might have with chatbot such as questions based on course type, course details.
- b. Chatbot responds to the query with reference to the above trained model.
- c. Chatbot uses Lancaster Stemmer and Natural Language Toolkit(nltk), python libraries to perform NLP operation to better understand the context
- d. Tensorflow, tflearn are used for building the neural network.
- e. Neural Network is 2 layer and softmax is used as the activation function.

Technologies Used:

- Neural Network
- Tensorflow
- NLP
- NLTK
- Python
- JavaScript

2. RECOMMENDATION SYSTEM

A Recommendation System was to be developed that would recommend learners with courses based on their interests, overall profile, similarity to other courses, etc. Recommendation System would aggregate all attributes of a course such as Course Title, Course Description, Languages, Domains, etc.

Development Methodology:

a. Recommendation based on **Related Courses:**

This scenario provides recommendation based on the course that the user has just completed. It takes into account the specifications of the course completed and returns the most similar course from the database. It utilizes Scikit learn Feature extraction CountVectorizer to convert the data into a sparse matrix and then uses cosine similarity measure to find the next course most similar to the given course.

b. Recommendation based on **User Profile:**

This scenario provides recommendation based on the profile of the user that is entered and provides the course which is most similar to the user profile. It utilizes Scikit learn Feature extraction CountVectorizer to convert the data into a sparse matrix and then uses cosine similarity measure to find the course most similar to the user profile.

c. Recommendation based on **Collaborative Filtering:**

This scenario provides recommendation based on the ratings given by users to certain courses and the ratings given by the current user to those courses and the relation between them. It utilizes the surprise open source library to implement the SVD++ collaborative filtering algorithm which returns the courses you are most likely to take based on what you and people similar to you have rated.

Technologies Used:

- Scikit learn
- Feature extraction
- CountVectorizer
- Surprise

3. SMART SEARCH

A Search Engine that provided the features of Auto-Completion of Search queries, Fuzzy-String matching and filtering of results based on other user's choices. Search would enable learner to find a specific course among the entire list of courses based on Course Id, Course Title, Department, etc.

Development Methodology:

- a. Returning results for search query is done by using fuzzywuzzy library based on Levenshtein Distance to calculate distances between sequences. This checks similarity between entered query and actual course title from the entire list.
- b. The results are ranked and sorted based on the Clickstream Analysis to show courses with highest preference above other courses. Fuzzy string matching ensures that there are no null results shown for any query.
- c. Auto-Complete to suggest queries on typed individual characters is implemented to reduce learner effort to type out complicated course titles and to avoid spelling mistakes.

Technologies Used:

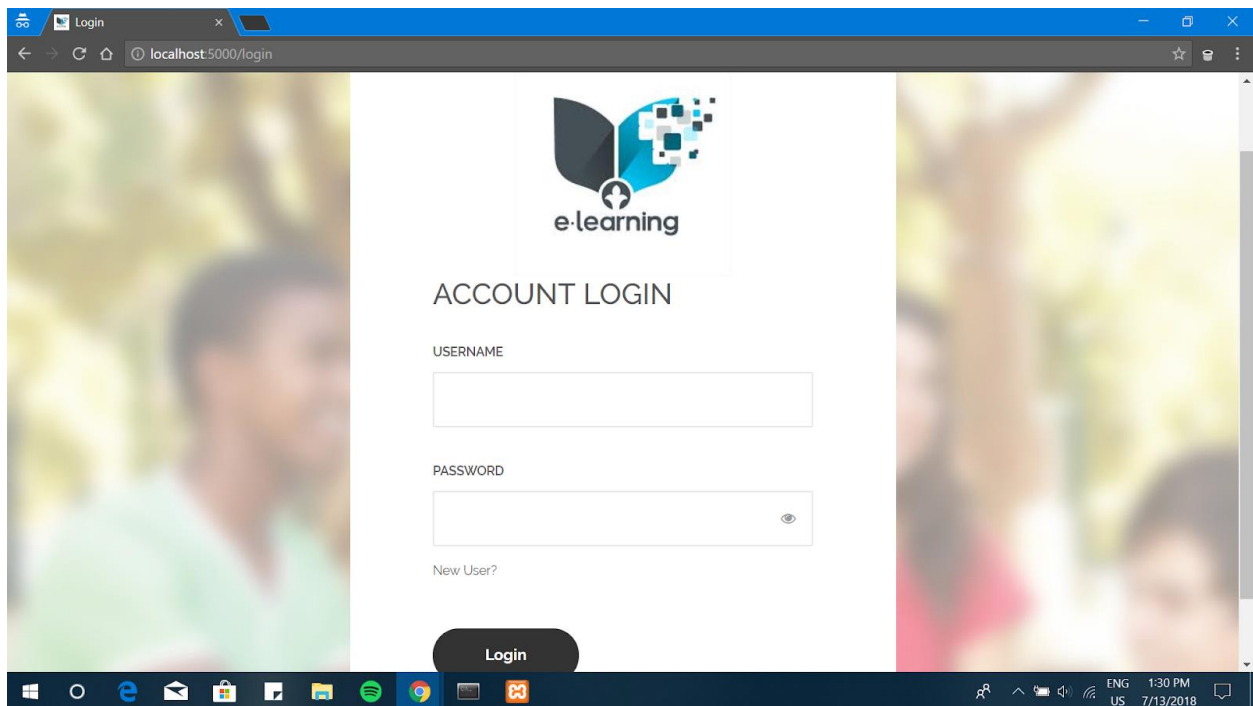
- JavaScript
- Fuzzywuzzy library
- Cosine Similarity
- Python

FINAL DELIVERABLE:

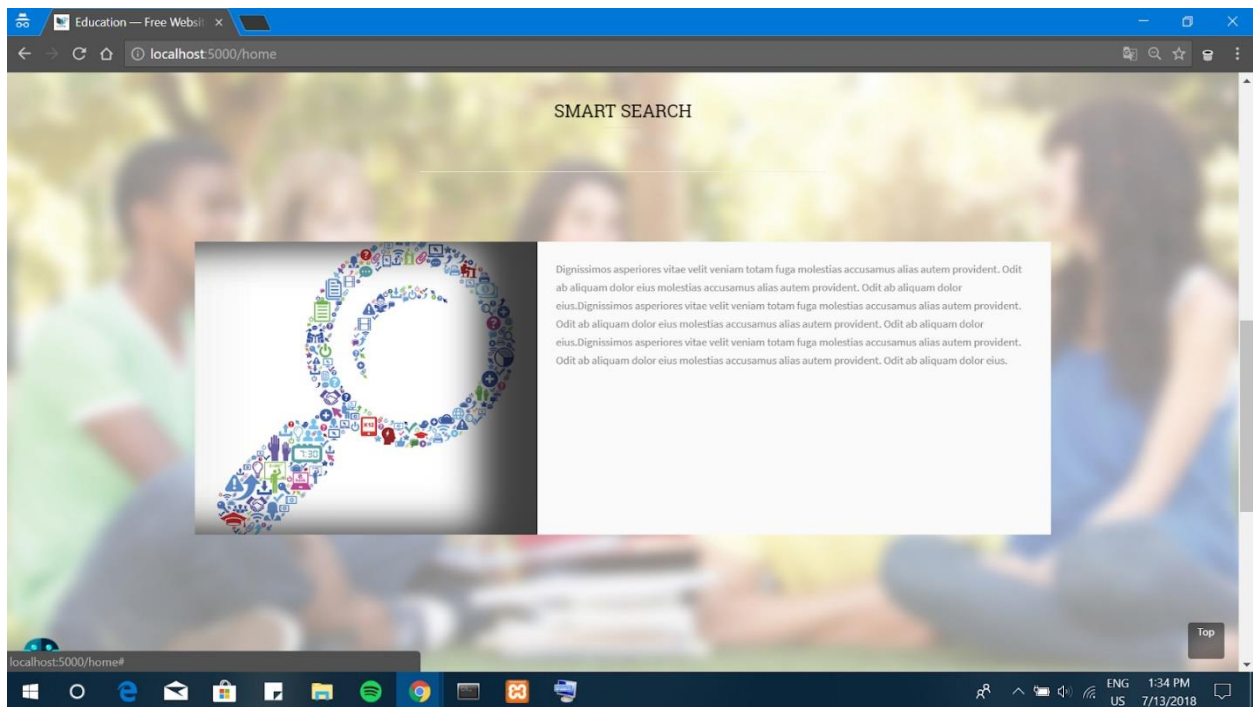
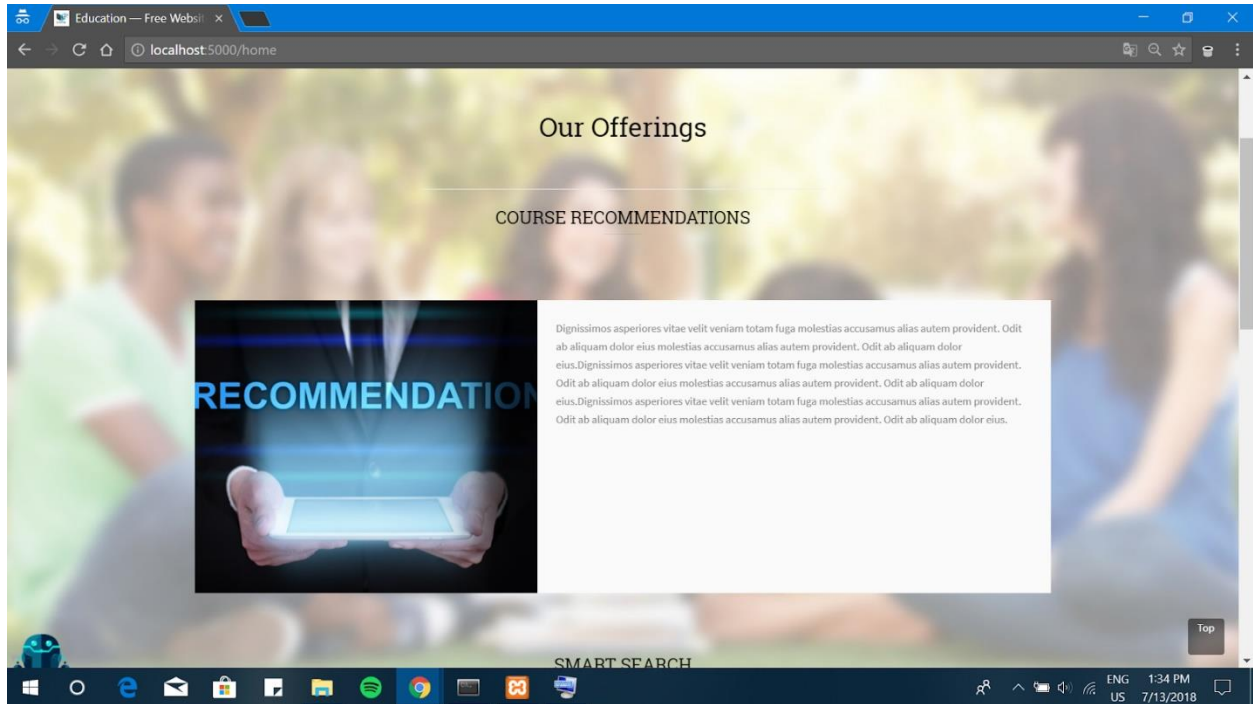
An E-Learning website with 3 main use-cases as offerings, individual course page, a recommendations page, a search bar on every page and a chatbot attached at the bottom of every page. This website encompasses all the above-mentioned concepts and features. It is web application that runs on Flask. All Machine Learning concepts are integrated into the backend and hence, serves as a final workable POC application.

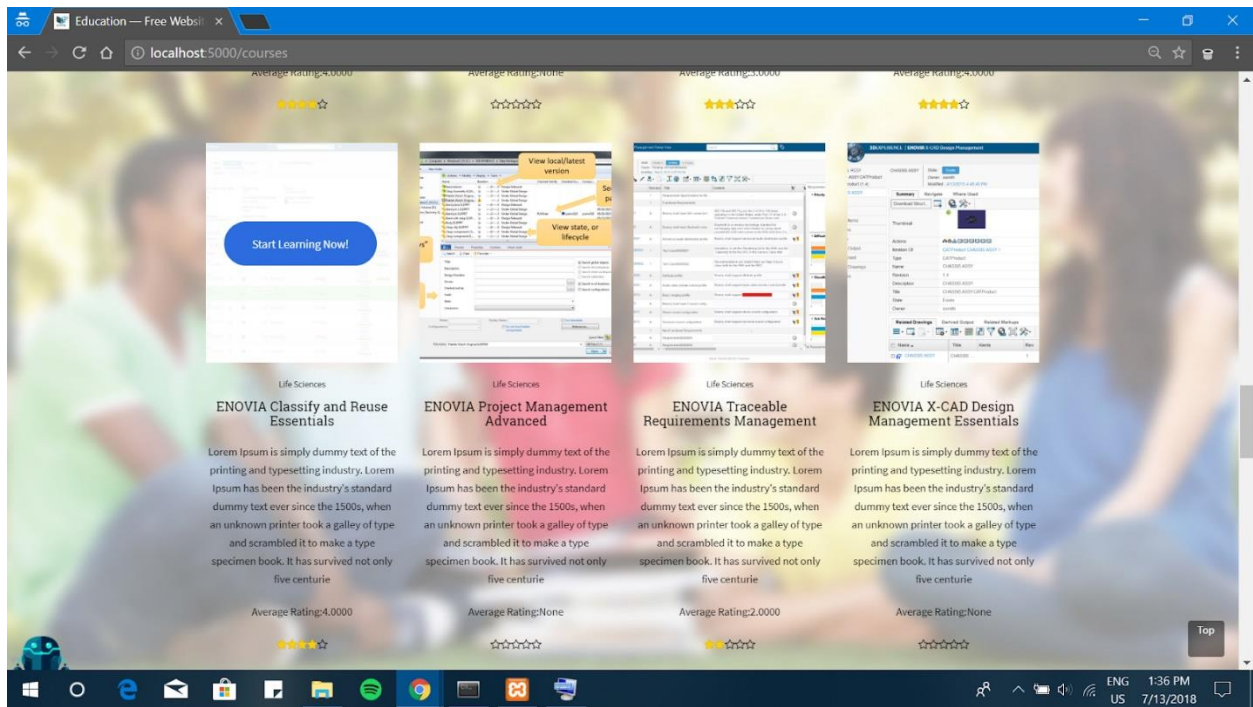
Some Screenshots:

1. Login Page:

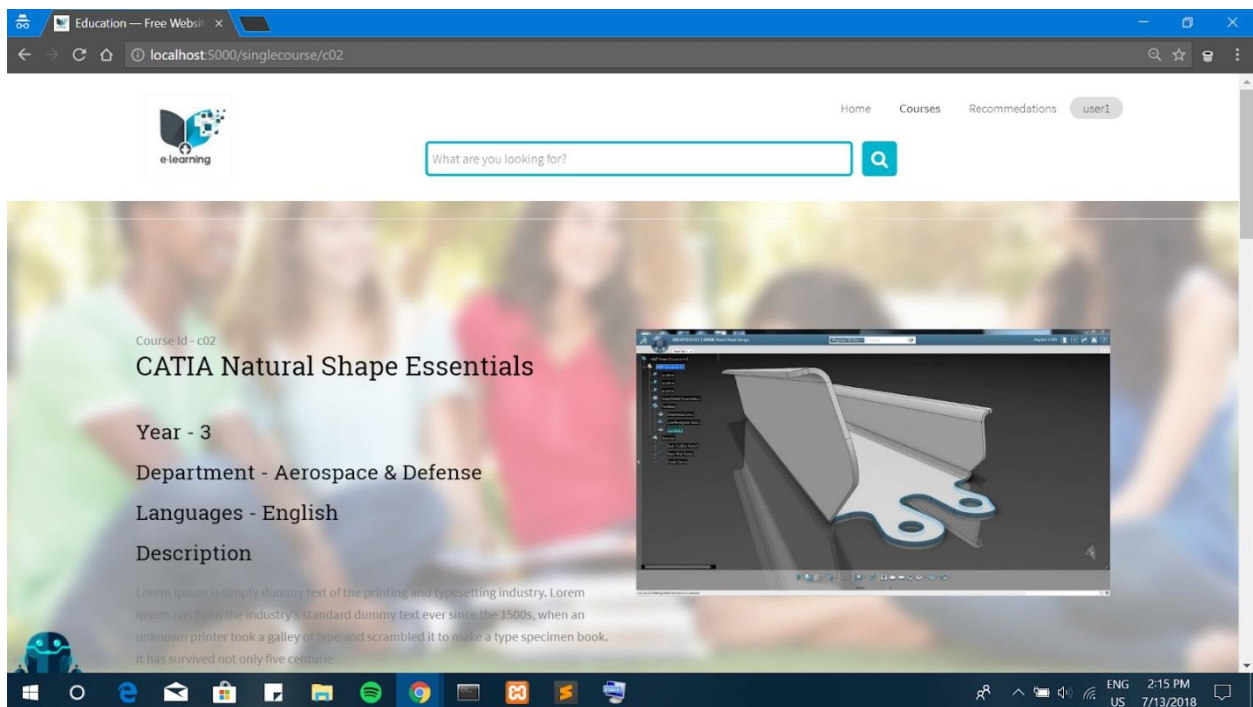


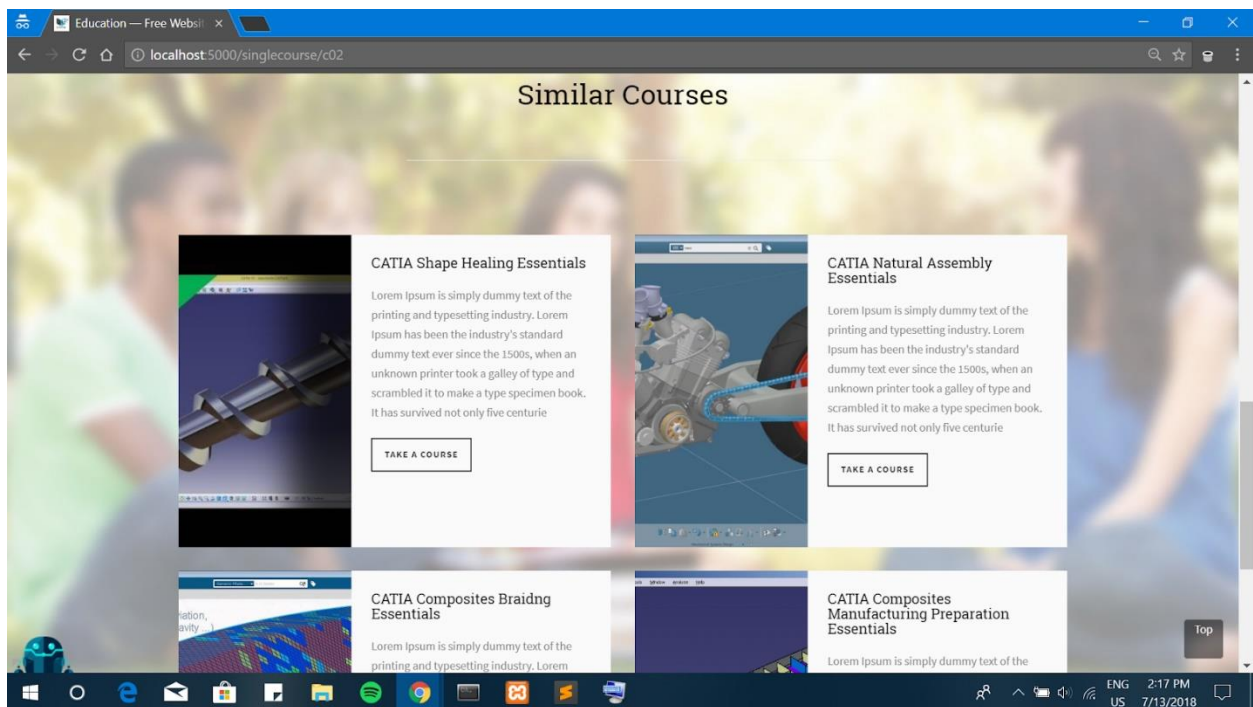
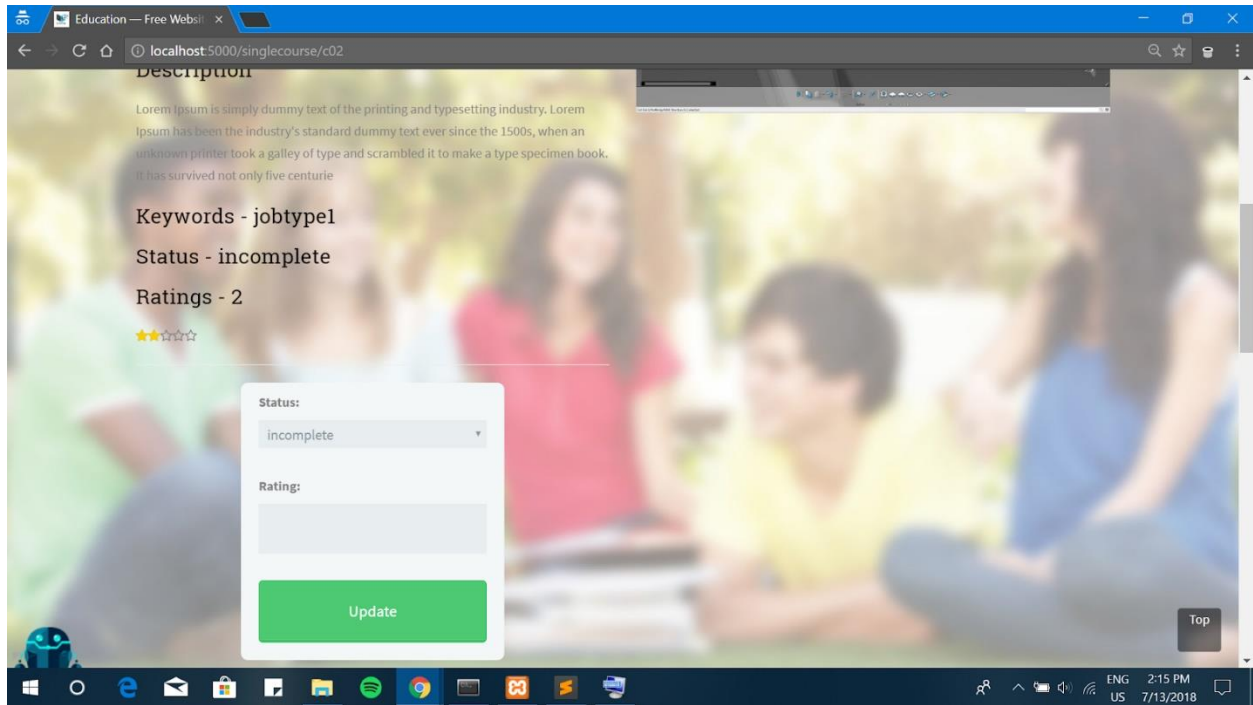
2. Our Offerings:



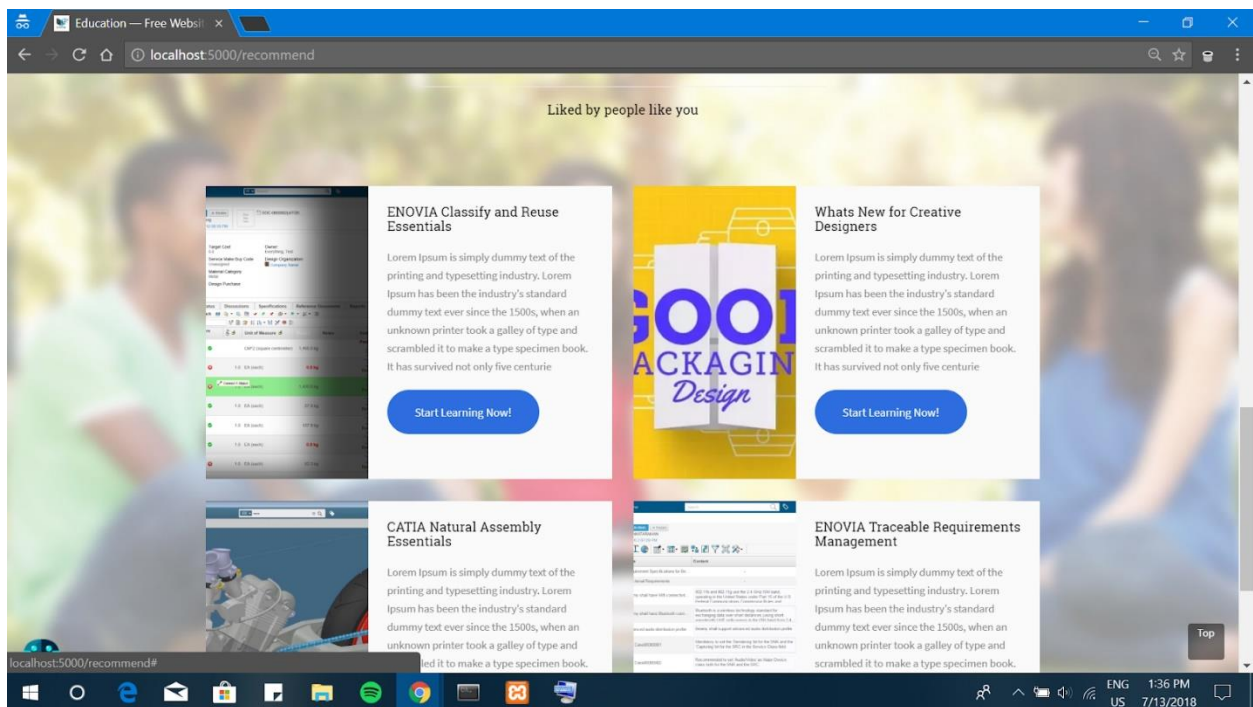
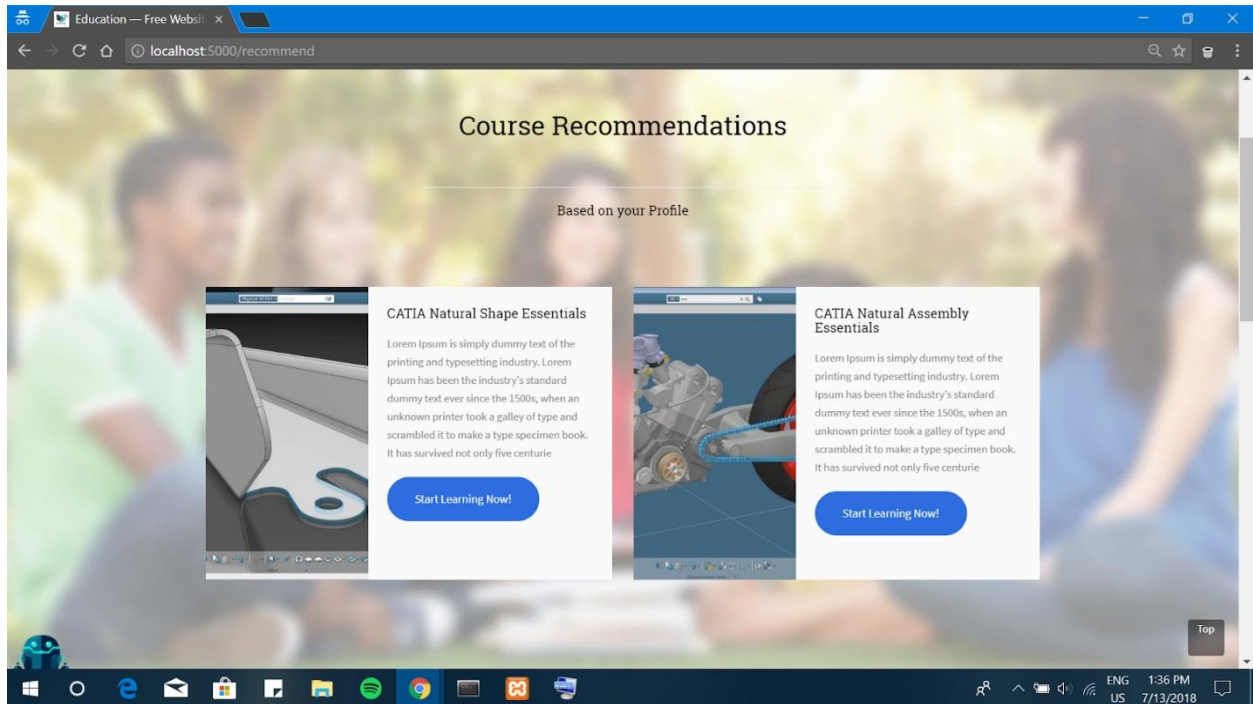


4. Individual Course Page:





5. Course Recommendations:



6. Profile Page:

The screenshot shows a web browser window with the address bar displaying "localhost:5000/profile". The page title is "Profile". The background is a blurred image of three people sitting outdoors. A white form titled "1 Your basic info" is centered on the page. The form contains the following fields:

- Name:** A text input field containing "user1".
- Rollno:** A text input field containing "1".
- Email:** A text input field containing "user1@gmail.com".
- Password:** A password input field containing three asterisks "***".

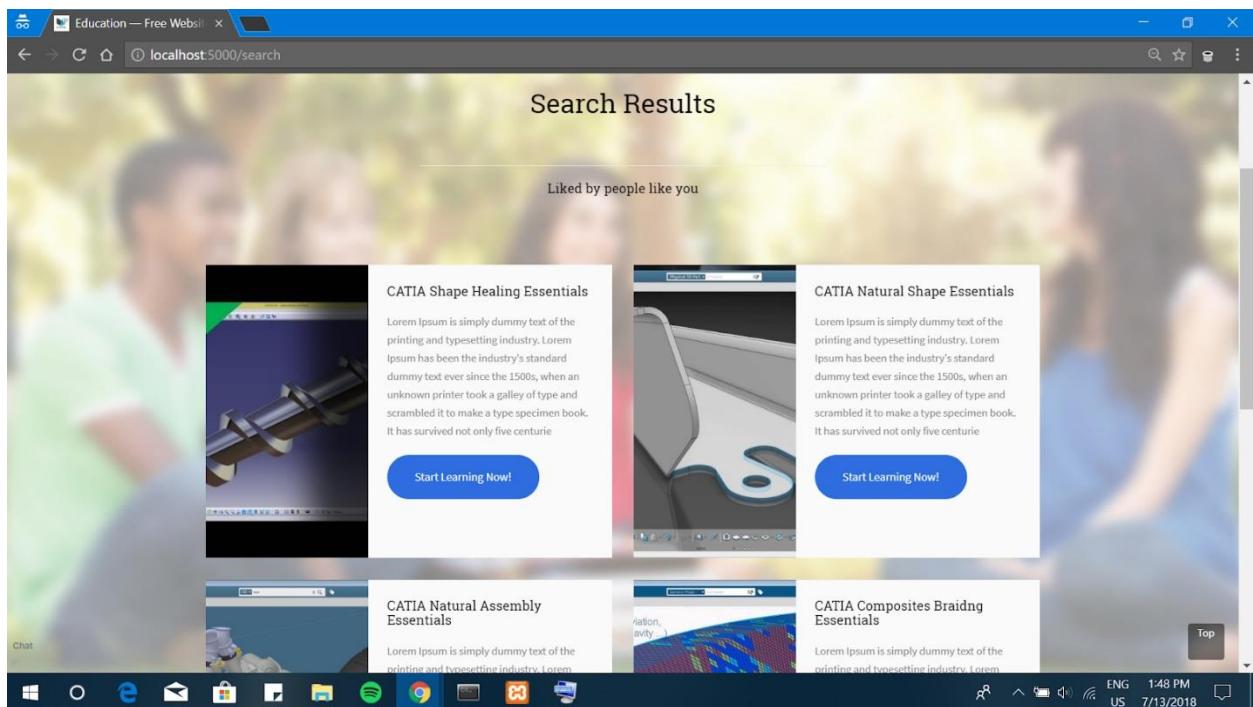
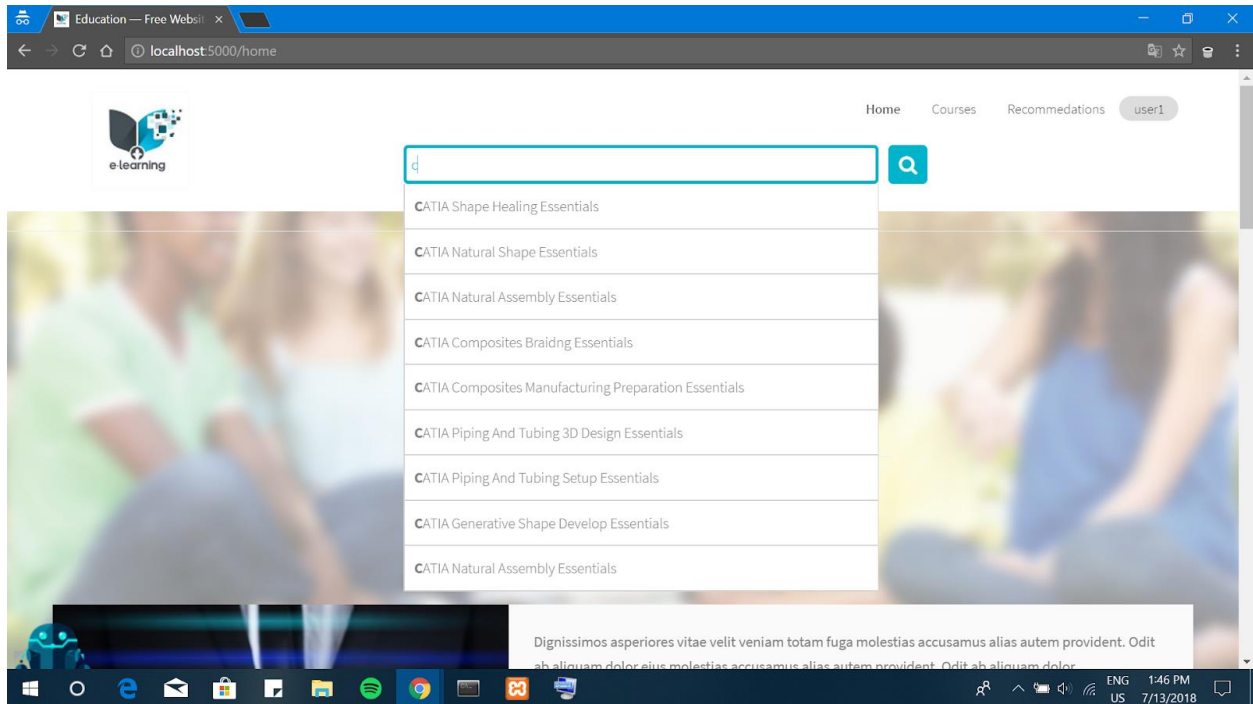
A "Top" button is visible in the bottom right corner of the form area. The Windows taskbar is visible at the bottom of the browser window.

The screenshot shows the same web browser window, but the form now displays "2 Your profile". The form contains the following fields:

- Year:** A dropdown menu showing "3rd Year".
- Department:** A dropdown menu showing "Aerospace & Defense".
- Language:** A list of checkboxes with "English", "Hindi", and "Marathi" all checked.
- Interests:** A list of checkboxes with "jobtype1", "jobtype2", and "jobtype3" all checked.

A green "Update Profile" button is located at the bottom of the form. A "Top" button is visible in the bottom right corner of the form area. The Windows taskbar is visible at the bottom of the browser window.

7. Smart Search



8. Chatbot

