Baby Steps

CSCI 6234 Object Oriented Design
Spring 2023 - Group 5

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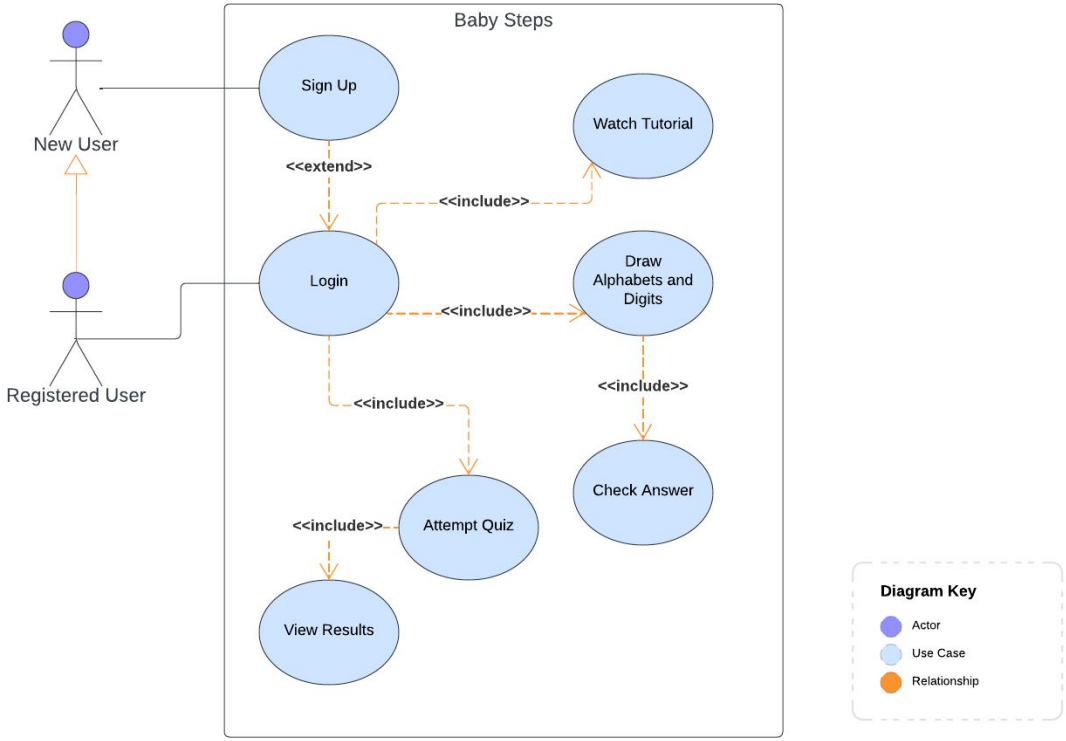
Vision

- In the era of digitalization, the vision of **Baby Steps** is to help preschoolers learn how to write alphabets and numbers in an easy-to-use and rewarding method.
- The application aims at making learning accessible to all children.
- The objective is to create a global learning tool seated at the cross-section of technology, interactive content, and personalized learning methods to help children become active self-learners.

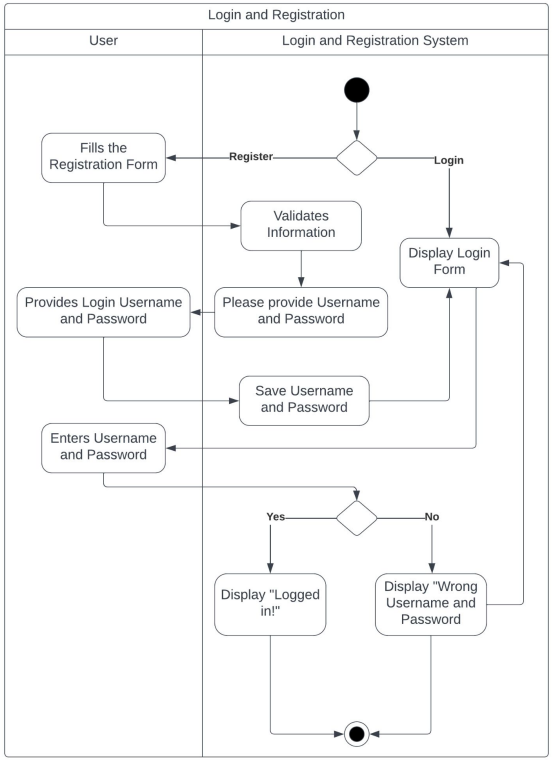
Use Case Diagram



Actors and Use Cases

- The actor is the parent/guardian of the pre-school child.
- The actor has two options upon opening the app : Sign in if they are not a registered user and Login if they are already registered
- Once logged in, pre-schoolers can watch a tutorial to learn how to write alphabets and digits
- They can practice by drawing these alphabets and letters and checking the answer (The result is compared using an Artificial Intelligence algorithm)
- The pre-schoolers can also attempt a quiz and view results

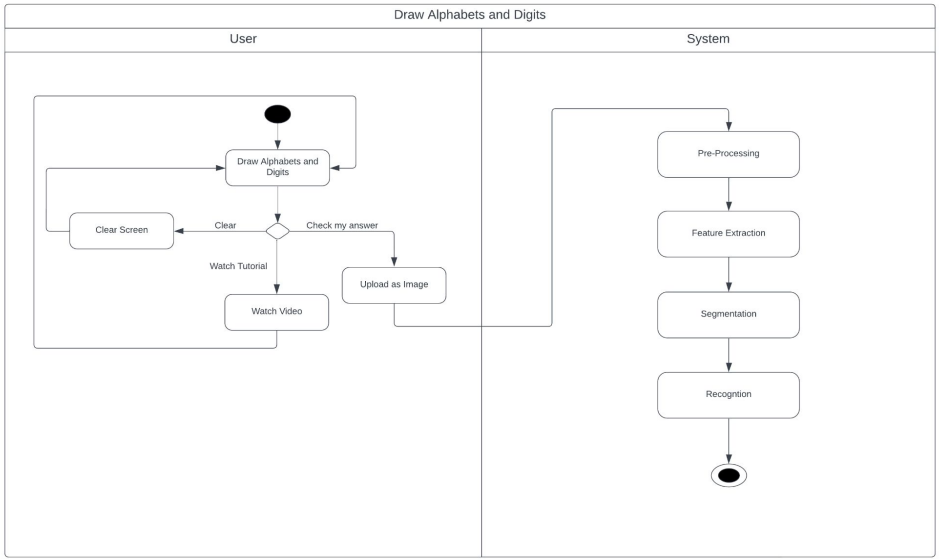
Activity Diagram (1)



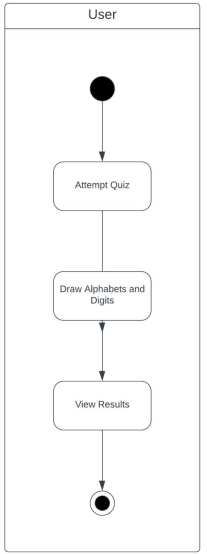
Login/Signup Use Case

Activity Diagram (2)

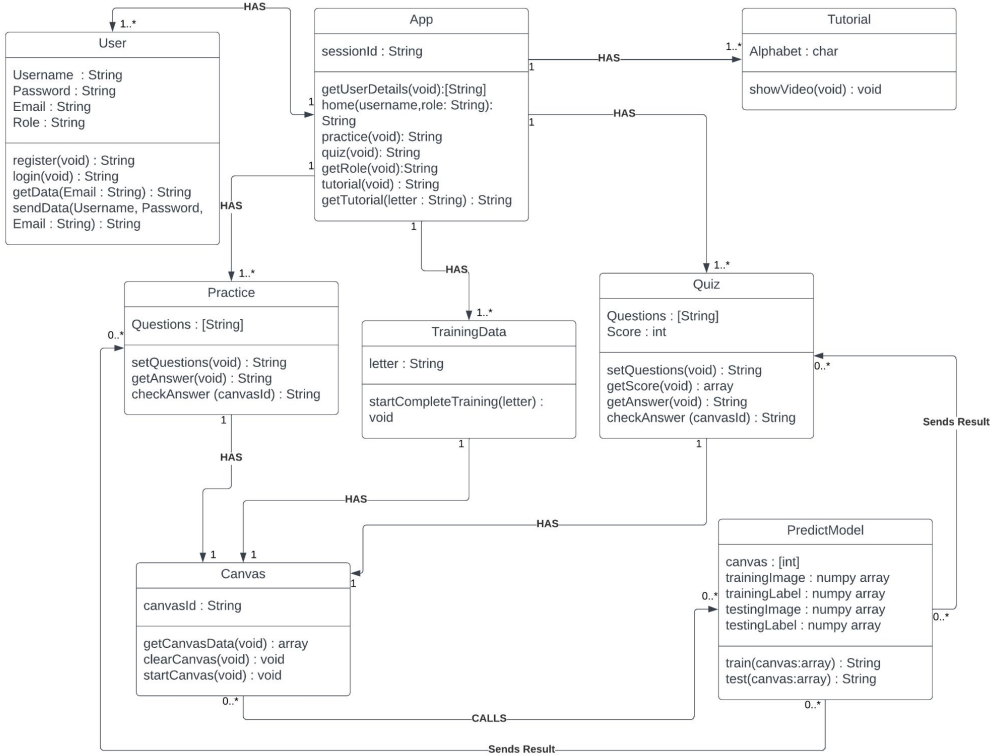
Draw Alphabets and Digits, Check Answer and Watch Tutorial Use Cases



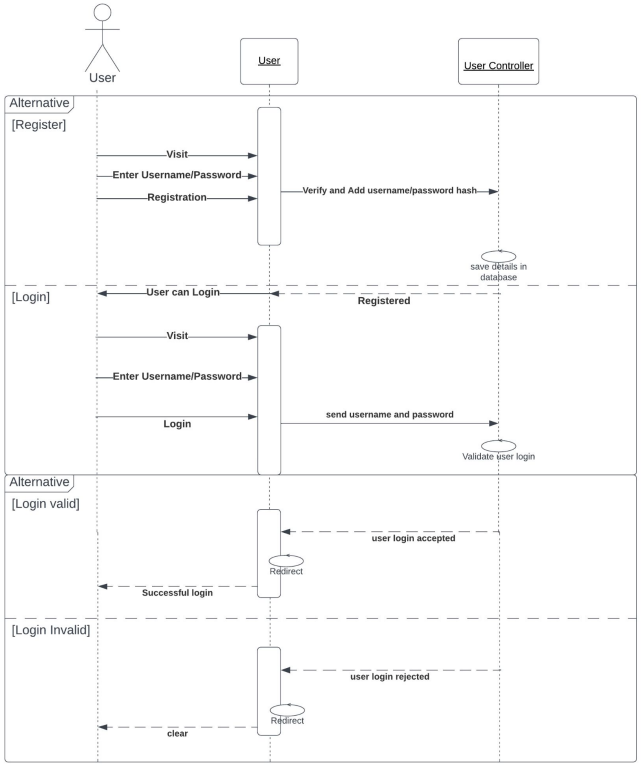
Attempt Quiz Use Case



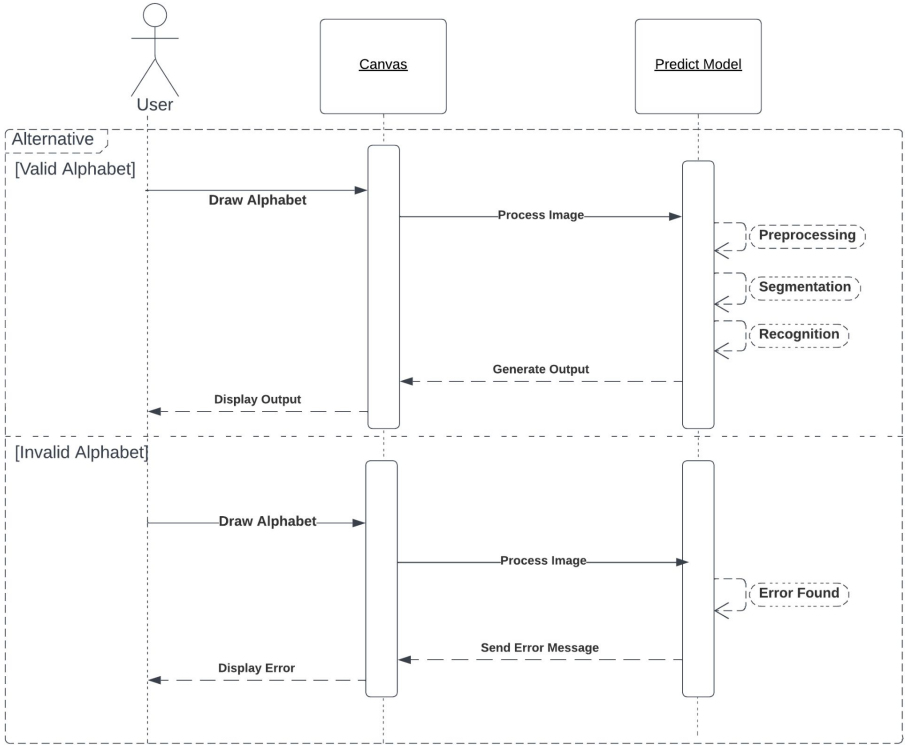
Domain Model



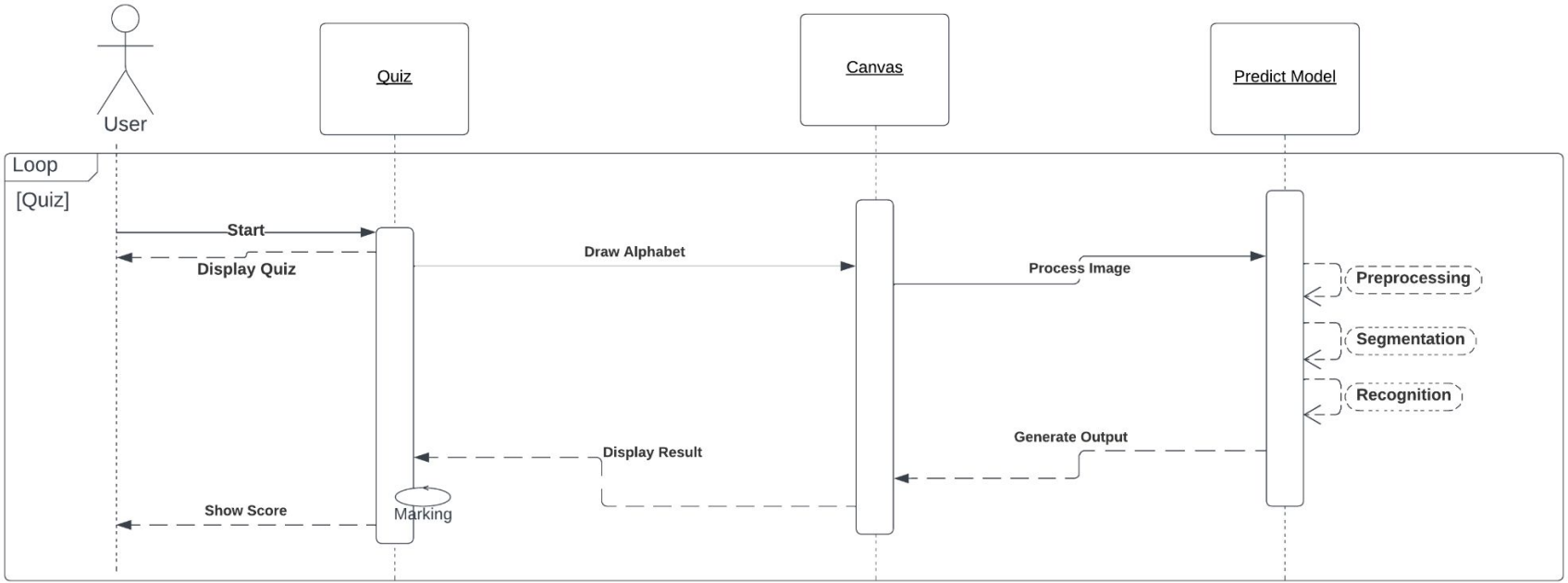
Sequence Diagram for User Registration and Login



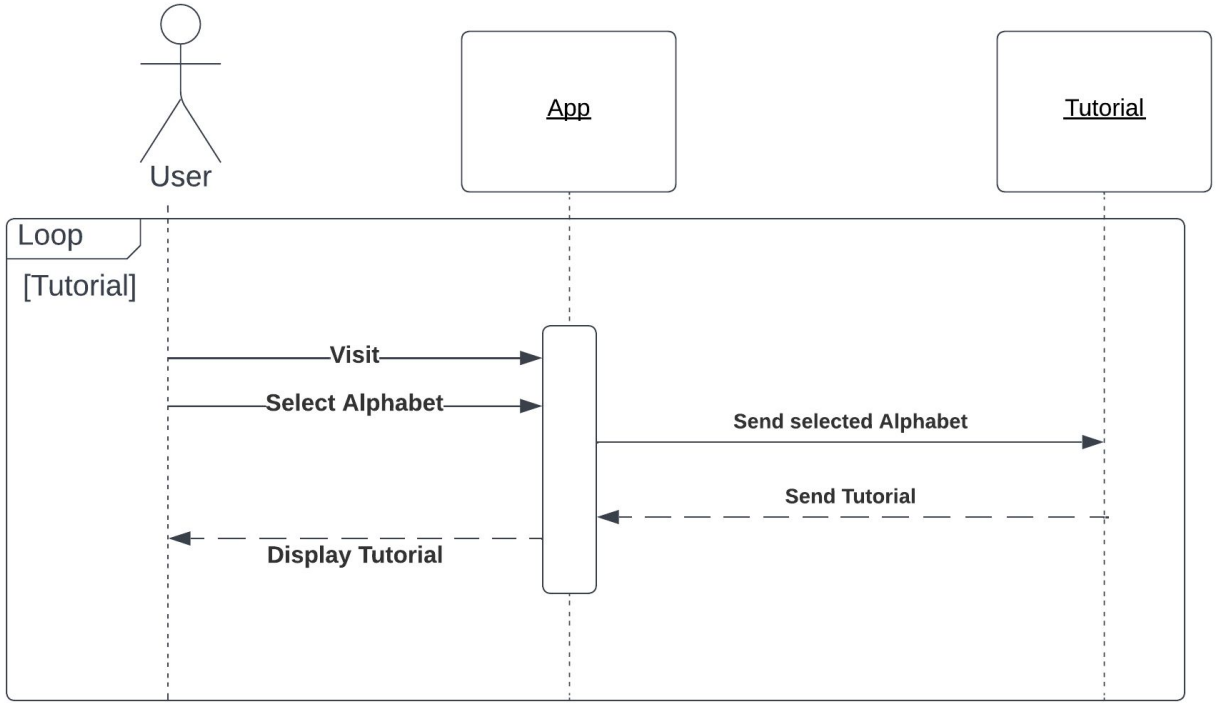
Sequence Diagram for Draw Alphabets and Digits



Sequence Diagram for Attempt Quiz and View Results



Sequence Diagram for Watch Tutorial

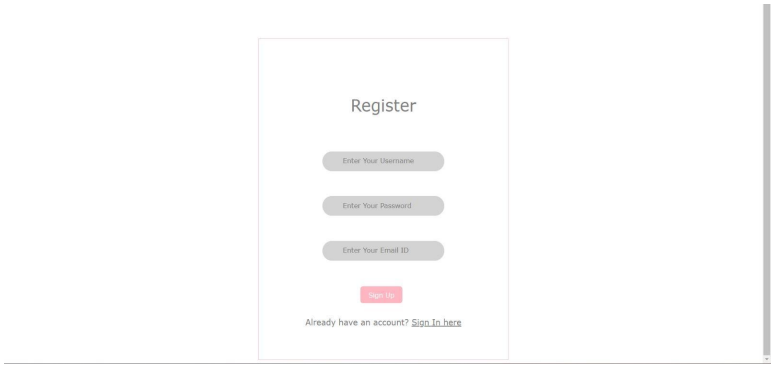


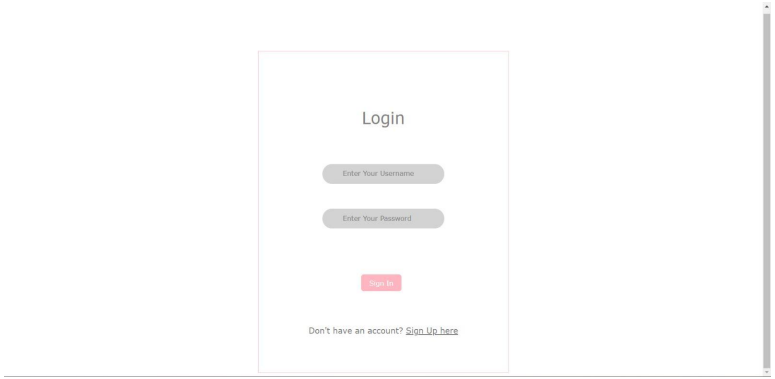
Project Architecture (Frameworks, Packages and Tools)

- **Language used is Python.**
- **Flask :** Web framework to create web apps
- **Jupyterlab :** Development environment that helps in illustrating the analysis process step by step
- **Tensorflow :** Library for ML tasks to train and test the model, Keras runs on top of tensorflow and provides functionality for working with deep neural networks
- **Seaborn :** Data visualization library based on matplotlib
- **Scikit-learn :** The confusion matrix functionality of scikit-learn is used to evaluate the accuracy of a classification.
- **NumPy :** High-performance multidimensional array object, and tools for working with these arrays.
- **Matplotlib :** Library for creating visualizations in Python
- **MySQL Workspace :** Database to store user account information

Registration and Login Page

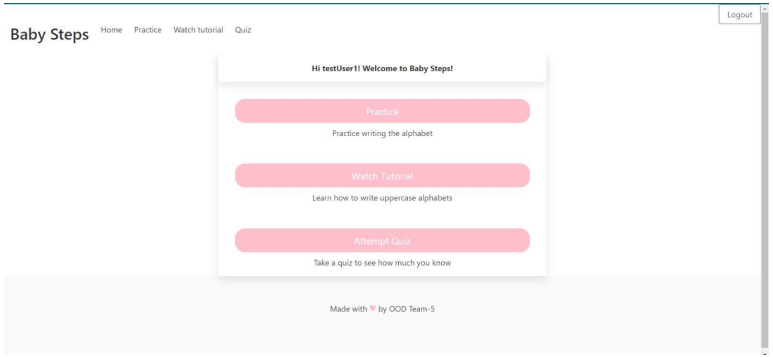
- Upon accessing the sign-up page, the user is able to register as a first time user with an E-mail ID, Username and Password.
- This is then sent to to the database to store the user's account information.
- The user is then able to login to the website using the credentials provided during registration

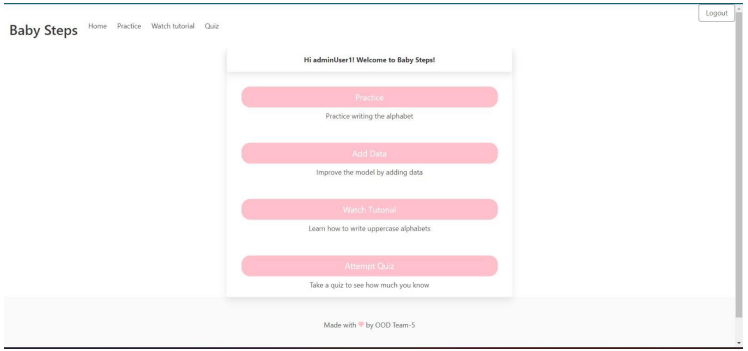




Home Page

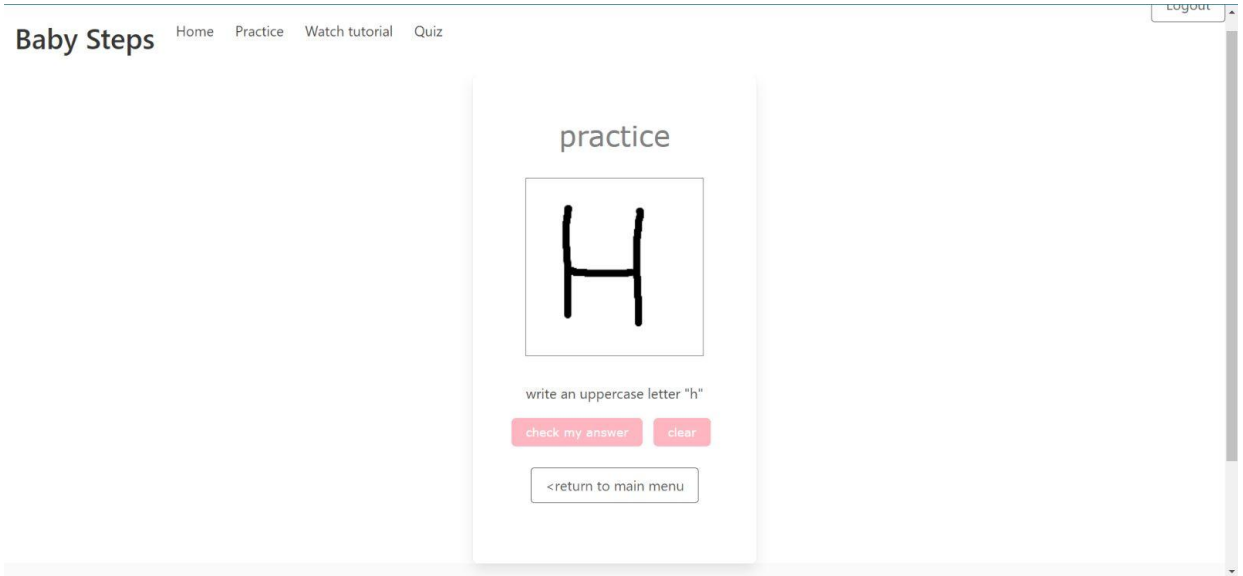
- From the home page, the user is able to access the following functions :
  - Practice
  - Watch Tutorial
  - Attempt Quiz
- By default the role is set to ‘user’, however if the role is ‘administrator’, the admin is able to view the ‘Add Data’ option as well.





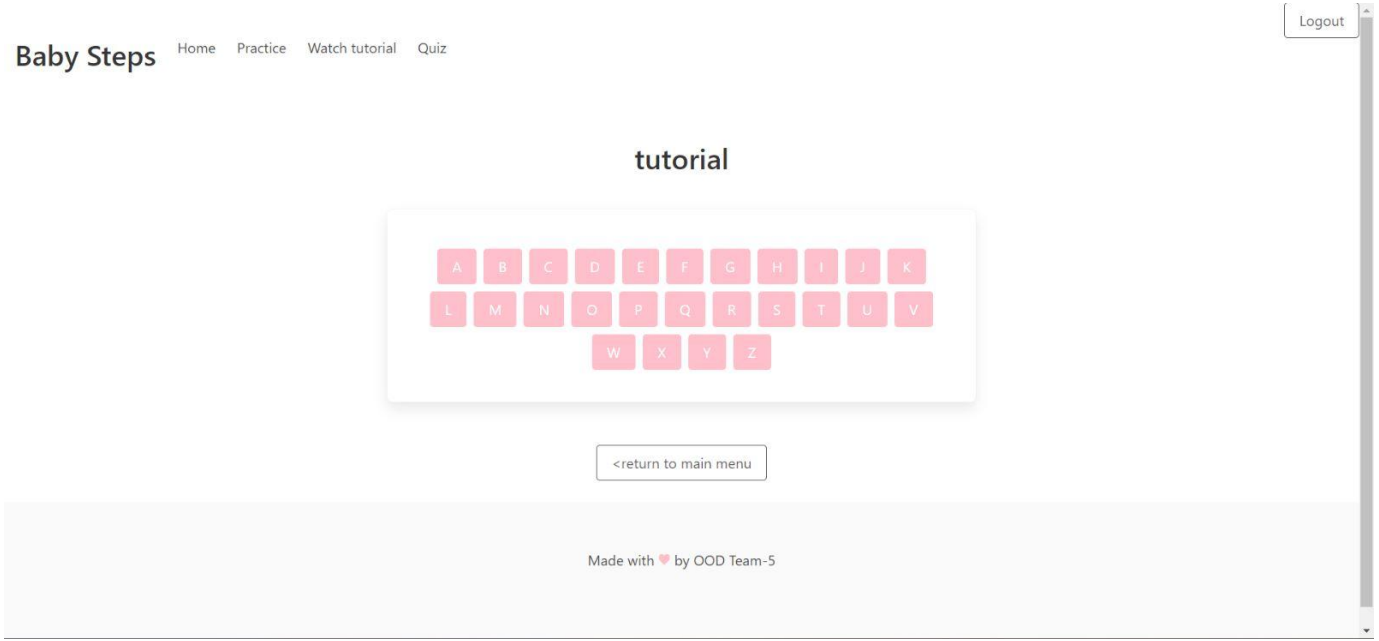
Practice

- The practice page allows users to practice writing upper-case alphabets
- The user can check the answer to verify if the correct alphabet was written or they can clear the canvas to try writing the alphabet again



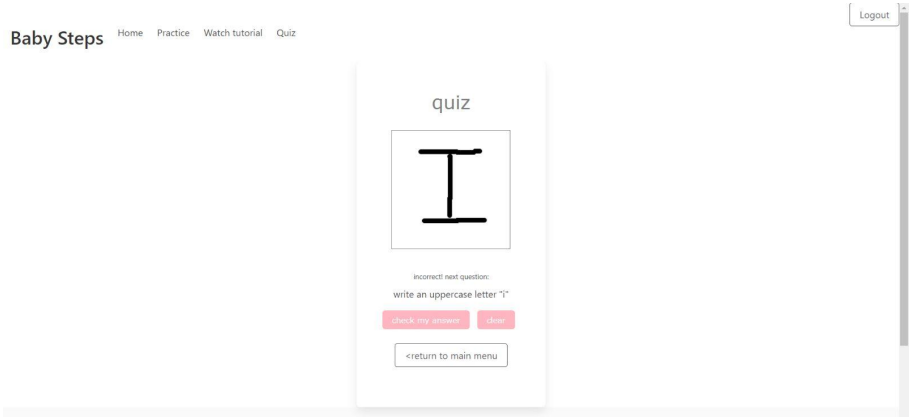
Watch Tutorial

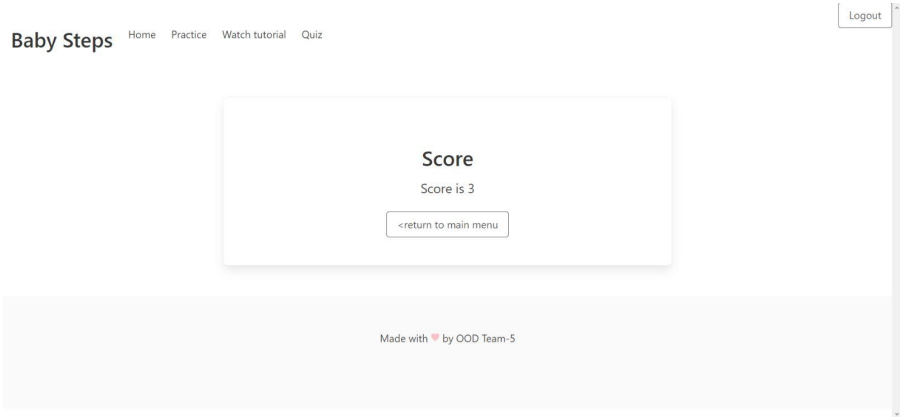
- In the watch tutorial page, users can click on a given alphabet which then leads them to a video on how to write the given uppercase alphabet



Attempt Quiz

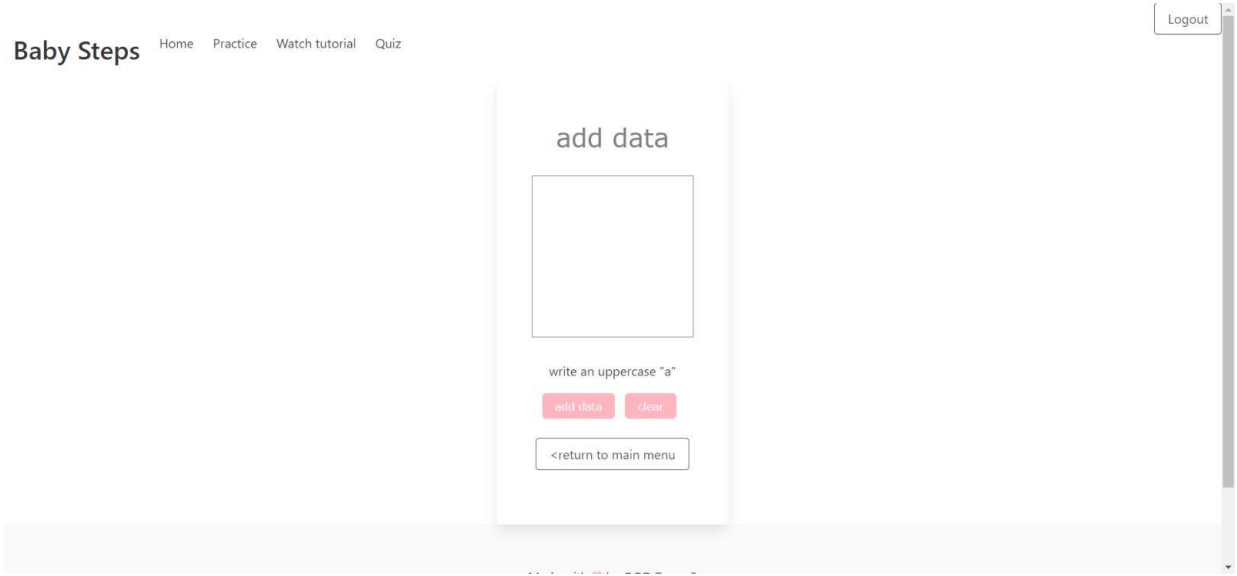
- The attempt quiz page allows users to write 5 uppercase alphabets and scores the users at the end out of 5 points based on how many answers they right.





Add Data (Admin Only)

- The add data page allows administrators to add data to improve the model
- The current model has been trained on 416 data points, the 26 alphabets have been trained 16 times each.



Github and Demo Links:

Links :

- Demo Video Link
- Github Repository Link

Instructions to Execute Project :

- Pre-requisites : Pycharm or any other IDE, Jupyterlab, MySQL Workbench
- Download the code linked in Github, install all packages needed including jupyterlab, open the model_training.ipynb file from the scripts folder on jupyterlab and run to train the model. Then run the app.py file, open the link given to access the website!