Title: 3D Shape Retrieval using View-Based Descriptors

Objective: The goal of this student project is to implement a 3D shape retrieval system using view-based descriptors. The project will involve the use of the trimesh library for handling 3D mesh data and PyTorch for building and training a neural network model for shape retrieval.

Tasks:

1. **Data Collection:**
    - Choose a dataset of 3D models with various shapes. You can use publicly available datasets like McGill dataset (https://www.cim.mcgill.ca/~shape/benchMark/).
    - Download and preprocess the data using the trimesh library to ensure compatibility with your chosen deep learning library.
2. **Data Splitting:**
    - Split the dataset into training and testing sets to evaluate the performance of the model accurately.
3. **Neural Network Model:**
    - Implement a method to generate 2D views from 3D shapes.
    - Design and implement a neural network architecture for 3D shape retrieval.
4. **Training:**
    - Train the neural network using the training set. Experiment with hyperparameters to optimize the model's performance.
    - Monitor the training process and visualize the learning curves to ensure the model is learning effectively.
5. **Evaluation:**
    - Evaluate the trained model on the testing set using appropriate metrics for shape retrieval performance (e.g., precision, recall, F1 score).
    - Visualize the retrieval results to qualitatively assess the model's effectiveness.
6. **Documentation:**
    - Provide comprehensive documentation for your project, including explanations of the implemented methods, any challenges faced, and the results obtained.
    - Include a user guide for running the code and reproducing the experiments.

Deliverables:

- Source code for the implemented 3D shape retrieval system.
- Documentation detailing the project, methods, and results.