Machine Learning Major Project:

**Topic: Image Classification using Convolutional Neural Networks (CNNs)**

**Description:**

The project involves building an image classification system using Convolutional Neural Networks (CNNs). CNNs are widely used for image-related tasks and have achieved remarkable success in various domains. This project will allow students to gain hands-on experience with deep learning, image processing, and model development.

**Steps:**

**1. Dataset Collection:**

Gather a large dataset of labeled images relevant to the chosen domain or application. You can explore publicly available datasets like CIFAR-10, ImageNet, or create your own dataset.

**2. Data Preprocessing:**

Preprocess the collected images by resizing them, normalizing pixel values, and splitting them into training and testing sets.

**3. CNN Model Architecture:**

Design and implement a CNN architecture suitable for image classification. Consider popular architectures like VGGNet, ResNet, or design your own architecture based on the problem requirements.

**4. Model Training:**

Train the CNN model using the training dataset. Experiment with different hyperparameters, such as learning rate, batch size, and optimizer, to achieve better performance.

**5. Model Evaluation:**

Evaluate the trained model using the testing dataset. Calculate metrics such as accuracy, precision, recall, and F1-score to assess the model's performance.

**6. Model Optimization:**

Fine-tune the model by applying techniques like data augmentation, regularization, or transfer learning to further improve performance.

**7. Deployment and Interface:**

Build a user-friendly interface where users can input images, and the trained model will predict the image class or category. You can use web frameworks like Flask or Django for this purpose.

**8. Documentation and Presentation:**

Document the project, including the dataset, preprocessing steps, model architecture, training process, evaluation results, and deployment instructions. Prepare a presentation to showcase the project's objectives, methodology, and outcomes.