

Capstone Project Proposal

Title: Image Classification using Deep Learning on the Caltech101 Dataset

This project will consist of the design of the deep learning-based image classification system based on Caltech101 dataset. There are 101 categories of objects in the dataset including airplanes, pictures of humans, faces and animals. Training and creating a convolutional neural network (CNN) in PyTorch allow one to do it by, The project will categorize pictures into the right categories. This will consist of preprocessing of data. The aspects encompass model design, training, evaluation and performance analysis.

One of the fundamental problems in computer vision is the image classification. Caltech101 lists balanced dataset in order to use deep learning method in a significant but not outrageous manner. The project enhances effective deep learning, facilitates application of theory and mimics an real-life vision project - making me ready to solve more complex problems in artificial intelligence in the future.

I will be working on the project in Python with PyTorch. The images shall be the first to be preprocessed (resized), normalize, divide into train/val/test) and then augment the data. The proposed CNN will be a custom one. differently trained, optimized, and made up on hyperparameters. I shall follow training by such metrics like loss accuracy. Depending on the assessment change will be done to better things model performance.

I will work on the Caltech101 caltech dataset of Torchvision. It has about 9,000 labelled images in 101 categories of objects. To make it manageable, I can choose some ~10-15 classes, with at not less than 100 images each per class.

I am going to test the model with the help of accuracy, precision, recall, F1-score, and a confusion matrix. The metric of the number of training/validation curves and sample misclassification will be interpreted with the help of visualization. strength and weaknesses of the model. The improvement will be carried out using cross-validation and fine-tuning. generalization.

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