Landmark Recognition using Image Processing and Machine Learning

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In the modern world, tourism has become one of the fastest growing industries. In every form of tourism, the tourists encounter landmarks, which they have no knowledge on them. The current way of identifying the landmarks is either to refer printed material such as books, magazines, which describe the important landmarks of the particular region, refer the Internet, or get the assistance from a tour guide. Referring printed material while traveling is not a practical solution in today's world. Referring the Internet may be practical, but after the landmark is accurately identified. Getting the assistance of a native person will involve financial costs and the source may be less reliable. As a solution to the above problems, we suggest a mobile application, which identifies landmarks using pictures and gives all relevant information, which would be useful for a tourist. The proposed solution uses image processing and machine learning to identify landmarks. A dataset of 5000 different landscapes is used in this project. The dataset was preprocessed using *Caffe deep learning framework* in order to remove unnecessary noise. One third of the dataset is randomly selected as the test set. The dataset was divided according to regions and models were trained for each region. *SVM* (Support vector machine), *BOW* (Bag of Words) and *CNN* (Convolutional Neural Network) algorithms were trained. The accuracy of the *CNN* model is 90%, while the accuracies of *SVM* and *BoW* are 70% and 60% respectively. Hence, the *CNN* model is used in this project. Dataset was divided according to regions and models were obtained for each region. Dividing the dataset into regions increased the accuracy and reduced the training time. The *GPS* data is used to identify the region and the appropriate model is used to retrieve the related information for the given landscape. The model was tested with real users and their positive feedback indicates the success of this project.

Keywords: Landmark recognition, Machine learning, Image processing, CNN