Image classification based on scenery

Sindhu Hachadad,Shrinivas Miskin,Shriya Bannikop,Sushmita Talawar

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Image classification refers to the task of extracting information classes from a multiband raster image. The resulting raster from image classification can be used to create thematic maps. Depending on the interaction between the analyst and the computer during classification, there are two types of classification: supervised and unsupervised. The problem of region classification in scenery/landscape images is gaining importance with an increase in the demand for automated, reliable, fast and efficient recognition which can make classification of images more important. It has become very difficult task to classify the images into interpretative classes. Apart from various learning algorithms the accuracy and performance of the model mostly depends on the trained dataset and the algorithm used. Here we have proposed a system to classify the scenery images into different groups of glaciers, street, mountains, trees, buildings and sea.

1 Introduction

Image classification is perhaps the most important part of digital image analysis .Rapid advances in computer vision and ongoing research has provided ways to create solutions that enable automated image tagging and automatically add tags to images to allow users to search and filter more quickly.

1.1 Overview of the project

The man in the pursuits of unravelling the nature,has tried to understand the building blocks of the universe.Image classification is a technique of labelling of images into one of a number of predefined categories. Classification is a task to identify the class/category of new instance based on training set.In this project the image dataset contains images belonging to 6 categories and a train,test and prediction set..This project contains use of models like CNN,resnet,transfer learning to predict the best accuracy to classify images into their respective categories.In this project the image undergoes preprocessing and the features are extracted by the model.The features are generated by the training set and are further used to train the model.

1.2 Motivation

Image identification powered by innovative machine learning has already been embedded in a number of fields with impressive success.Classification is very important as we use it in daily life. It makes things easier to find and recognise. Differentiation of objects is what allows us to classify them into groups.

It is used for automated image organization of large databases and visual websites, as well as face and photo recognition on social networks such as Facebook. Image recognition makes image classification for stock websites easier, and even fuels marketers' creativity by enabling them to craft interactive brand campaigns.

In this section we will introduce the Image Classification problem, which is the task assigning an input image one label from a fixed set of categories. This is one of the core problems in Computer Vision that, despite its simplicity, has a large variety of practical applications. Moreover, as we can see, many other seemingly distinct Computer Vision tasks (such as object detection, segmentation) can be reduced to image classification.

1.3 Objectives of the project

1. Understanding the working of CNN models and to know how it can be applied to classify the images
2. Design a system which will be able to classify the natural scenes i.e.mountains , forests, seas, glaciers, buildings, and streets.
3. Identify the object and classify into respective group.
4. Compare the results of different classifiers implemented.

1.4 Literature Survey

Image processing is a topic that has been receiving a lot of importance these days. It occupies a prominent space in applications involving classification. Including image processing in the various fields would prove to be advantageous as it would reduce the work and time . Various methods have been introduced into this field to improvise the quality. According to the observations over a period of time these technologies have made the classification process quite simpler.

1.5 Problem definition

Develop a system to classify images based on scenery i.e buildings, forest, sea, glaciers,mountain,street

2 Proposed System

2.1 Description of proposed system with simple block diagram

The input to this system is image and then is preprocessed to get features and then the model is trained so that it has to classify the image into respective category. i.e .mountains , forests, seas, glaciers, buildings, and streets

2.2 Description of Target Users

System:The system should be able to classify images which good accuracy into their respective categories

2.3 Advantages/applications of proposed system

1. Drones: Drones equipped with image classification and recognition capabilities can provide vision-based automatic monitoring, inspection, and control of the assets located in remote areas.
2. Military Surveillance: Detection of unusual activities in the border areas and automatic decision-making capabilities can help prevent infiltration and result in saving the lives of soldiers.
3. Searching: Faster searching of images .
4. Forest Activities: Unmanned Aerial Vehicles can monitor the forest, predict changes that can result in forest fires, and prevent poaching. It can also provide a complete monitoring of the vast lands, which humans cannot access easily.

2.4 Scope

- The proposed system can be used in any robots so that it can recognise the images and classify.
- The proposed system can be used in online searching .

3 Software Requirement Specification

3.1 Overview of SRS

A software requirements specification (SRS) is a description of a software system to be developed. It lays out functional and non-functional requirements, and may include a set of use cases that describe user interactions that the software must provide. Software requirements specification establishes the basis for an agreement between customers and contractors or suppliers (in market-driven

projects, these roles may be played by the marketing and development divisions) on what the software product is to do as well as what it is not expected to do. It should also provide a realistic basis for estimating product costs, risks, and schedules. Used appropriately, software requirements specifications can help prevent software project failures.

3.2 Requirement Specifications

3.2.1 Functional Requirements

1. User level
   (a) User shall be able to view images.
   (b) User shall be able to see the category under which it belongs to.
2. System level
   (a) System shall be able to store data.
   (b) System shall be able to extract features.
   (c) System shall be able to resize the images.
   (d) System shall be able to categorise the images.

3.2.2 Non Functional Requirements

1. Response time minimum 3-5 seconds in 95
2. Ease of use
3. The size of image should not exceed 30KB.
4. The system should be able to expand for further storing.
5. The system should be compatible with any browser on any environment.
6. The system should be able to perform a failure-free operation for a specified period of time in a specified environment.

3.3 Software and Hardware requirement specifications

1. Hardware requirements
   (a) Any CPU (Intel i5/ i7/ Xeon recommended).
   (b) A minimum of 2 GB of RAM
   (c) GPU(NViDIA graphics card for faster computation)
   (d) Keyboard and a Microsoft Mouse or some other compatible pointing device.
2. Software requirements

(a) Windows 8, 10, 64 /32 bits

(b) Jupyter Notebook/Google Colab

(c) Browsers: Chrome* 36+, Edge* 20+, Mozilla Firefox 31+, Internet

(d) Explorer 11+ (Windows only), Safari 6+ (MacOS only)