Image Processing, Object Detection And Object Classification

Abstract

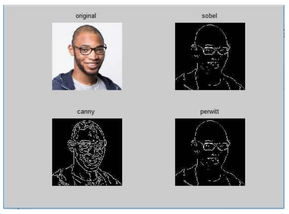
This project presents an in-depth experimental study on object classification and object detection. Feature-classifier combinations are examined with respect to their performance and efficiency. Regarding the classifiers experiment is performed on a large set of data consisting of approximately 800 motorbikes and 800 airplanes. Meaningful results are obtained by analysing performance variances caused by varying training and test sets. In object detection features are extracted from the object then compared with features extracted from an image which contains multiple objects. In order to get the best results the data set must be prepared first by applying image processing techniques to get stronger features

Project's Overview

This project aims to solve the problem of object recognition first of all we need to handle a large set of data then we apply image processing techniques then we detect this object by comparing its features with extracted features from our set this is how we managed to search for an object in an image after detecting an object we want to classify this object so we trained a classifier with features from different types of objects and the classifier tells us what this object type is.

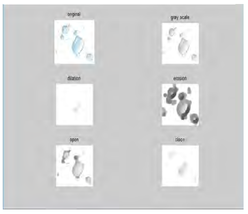
Handle a large set of data → Dara Preparation → Train A Classifier → Test The Classifier

Image processing GUI



application of edge detection is in **detecting objects in an image** .
An easy way to isolate objects in an image
is to threshold the image.
But thresholding may not always give you
the result you desire.
This is where edge detection helps.
Edge detection helps in better isolating the objects in an image.

An image looks more sharp or more detailed,so we simple reduce
the edge content and makes the transition form one color to the other very smooth.



Morphology as a tool for images transformation works in close
range photogrammetry for many years.
It has been used for extracting edges and detecting characteristic objects in mobile photogrammetry systems

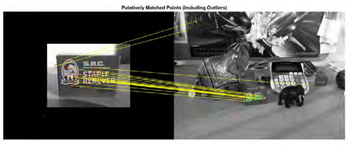
This is graphical user interface that allows users to interact with electronic devices through graphical icons and visual indicators , instead of text-based user interfaces.

Object detection

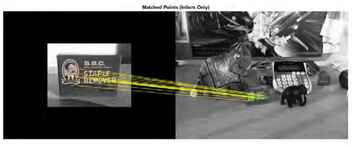
Read the reference image containing the object of interest.

Read the target image containing a cluttered scene.

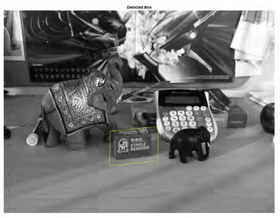
Detect feature points in both images.



Match the features using their descriptors.



Display the matching point pairs with the outliners removed.



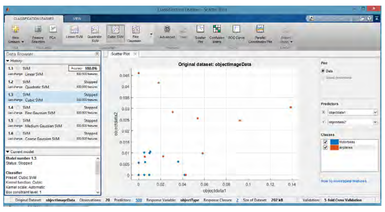
The detected object.

Object classification

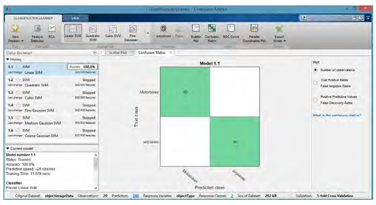
Work flow

Read image set → Extract features → Train a classifier → Test the classifier

In this model we managed to



Training The classifier



Training results

Testing the classifier

Results

We managed to prepare a set of images using Image processing techniques (histogram equalization, contrast, morphological operations and some effects) in order to get strong features then using object detection techniques we managed to detect an object in a cluttered scene and we also managed to classify this objects using classification techniques.

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