The Sift Algorithm Based Fake Coin Detection

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***Abstract*-This paper presents a method for detection of fake coins using image processing. A coin image is represented in a dissimilarity space, which means vector space is constructed for comparing the two coin images. For comparison we detect the key points of two images and describes the key points in vector space. For the above two process we take the algorithm know as SIFT(Scale Invariant Feature Transform) . The features of the image has to detected, these are called SIFT features of the image, from these identified features the SIFT key points has to be detected. Then the described features are subjected to removal of key points which has low contrast. after that the survived key points are matched between two images. Here , a classifier is used to classify the result ,whether there are many types of classifier. In our paper we use SVM, due to limited number of fake coins in our real world we propose one class SVM. So only genuine coin are used in dataset.**

Key words- fake coin, fake coin detection, representation in dissimilarity space, SIFT(Scale Invariant Feature Transform), one class SVM(Support Vector Machine).

INTRODUCTION

The image processing techniques done on the images are wide in varieties which will cause the different effect on the images likewise some of the techniques such as copy-move (or) splicing, signature, watermarking or any other object which get added to the original by various means. coins are widely used in our daily life such as vending machines, parking meters, telephone booths and so on. Compared with paper currency, coins benefit from their great resistance to abrasion, and thereby can be used for quite a long time. However, in recent years, a lot of illegal counterfeiting rings manufacture and sell fake coins, which have caused great loss and damage to the society. The fake coins made nowadays are of fairly high quality, so they often bear great resemblance to their genuine counterparts, which renders the detection of fake coins extremely challenging.

Digital image processing is an area characterized by the need for extensive experimental work to establish the viability of proposed solution to a given problem, here the solution is to find the fake coins using an image. An important characteristic underlying the design of image processing system is the significant level of testing and experimentation that normally is required before arriving at an acceptable solution.

This characteristic implies that the ability to formulate approaches and quickly prototype candidate solution generally plays an important role in reducing the cost and the time required to arrive at a viable system implementation .digital image processing is the user of computer algorithms to perform image processing on digital images. as a subfield of digital signal processing, digital image processing has many advantages over analog image processing. it allows a much wider range of algorithms to be applied to the input data, and can avoid problem as much as build up of noise and signal distortion during processing.

The entire process in this paper can be defined with the help of the flow chart given below. In this the input image is given for which we have to calculate the scaling factor,based on the scaling factor thus calculated the features of the image has to be extracted with the help of the SIFT algorithm.This extracted feature is then classified with the Bayesian classification and k-means clustering algorithm.

LITERATURE SUEVEY:

[1]. In this survey, a complete analysis of object recognition methods based on local invariant features from a robotics perspective was presented. The survey includes a brief description of the main algorithms described in the literature, with specific analyses of local interest point computation methods, local descriptor computation and matching methods, as well as geometric verification methods. Different algorithms were analyzed by considering the main requirement of robotics applications: real-time operation with limited on-board computational resources and constrained observational conditions derived from the robot geometry (e.g. limited camera resolution). Evaluations in terms of accuracy, robustness, and efficiency were presented. In addition, various object recognition systems built using different keypoint-descriptor combinations were evaluated in a service-robot domestic application, where the final task to be performed by a service robot was the manipulation of objects. From the results reported it can be concluded that for robotics applications (i) the most suitable keypoint detectors are ORB, BRISK, Fast Hessian, and DoG, (ii) the most suitable descriptors are ORB, BRISK, SIFT, and SURF, (iii) the final performance of object recognition systems using local invariant features under real-world conditions depends strongly on the geometric verification methods being used, and (iv) the best performing object recognition systems are built using ORB-ORB and DoG-SIFT keypoint-descriptor combinations. ORB-ORB based systems are faster, while DoG-SIFT are more robust to real-world conditions.

[2]. The system developed in this paper is intended for the recognition of given classes of environmental sounds and is motivated by a practical surveillance application. The

proposed system uses a discriminative method based on one-class SVMs, together with a sophisticated dissimilarity measure, in order to classify a set of sounds into predefined classes. The effectiveness of various acoustic features as well as the influence of features combinations were studied. We focused on novel sets of relevant features derived from wavelet decompositions. Besides, this paper deals with robust features used with a 1-SVM-based classifier in order to have a system that quietly works, independent of recording conditions. More research is needed to understand how adapting 1-SVMs parameters for sound classification occurs under very noisy conditions. This can be achieved by using different kinds of techniques that aim to use adaptation methods or robust decision strategies.

BLOCK DIAGRAM

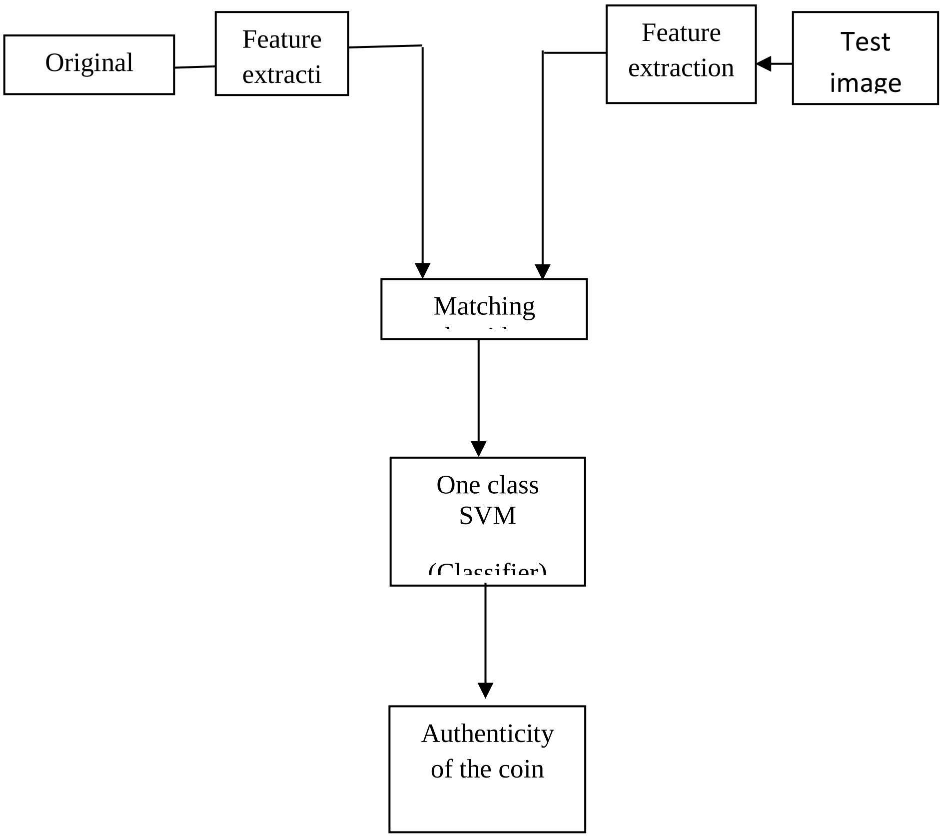

Fig.1 Operational diagram

SCALE INVARIANT FEATURE TRANSFORM:

The scale invariant feature transform is a feature extraction where it transform image feature into scale-invariance co-ordinates. The main goal of the SIFT is

- Extract distinctive invariant features
- Matching
- Invariance to scale and rotation
- Change in 3D point view
- Addition of noise

Step:1 scale space peak selection (different sigma)

i)those will be potential points.

Step:2 key point localization

Step:3 orientation assignment

i)assigning orientation to the key points.

Step:4 key point descriptor

i)describing the key point as a high dimensional vector(128 feature vector)

SUPPORT VECTOR MACHINE:

Support Vector Machines are perhaps one of the most popular and talked about machine learning algorithms. They were extremely popular around the time they were developed in the 1990s and continue to be the go-to method for a high-performing algorithm with little tuning. In SVM the input high dimensional vectors are given, then the datum are classified using the linear classifier. At the end we can simply obtain the result by observing the classifier model done with training samples. As we are taking only the circle image so the one class learning is used instead of analyzing whole image. With a set of training samples from the same class, the basic idea of one-class SVM is to learn a hypersphere which can enclose most of the training samples while minimizing the volume of the sphere at the same time. As with SVM, the kernel trick is employed to map the input data to some feature space in which they can be linearly separable. In the mapped feature space, the origin is considered as the only sample from the second class. Then a maximum margin hyperplane separating the training samples from the origin will be learned.

CONCLUSION :

A fake coin detection method using the characteristics of coin image which is proposed in this paper. The coin image is represented in the dissimilarity space, whose dimension is determined by the number of prototypes. Each dimension corresponds to the dissimilarity between the coin image under consideration and a prototype. In order to compute the dissimilarity between two coin images, the local key points on each image are detected using the DOG detector and then described by the SIFT descriptor. Afterwards, the matched key points between the two images can be identified efficiently based on the characteristics of the coins. We also propose a post processing method to remove mismatched key points. Since the number of fake coins is very limited in real life, we conduct one-class learning. It is distinguished by the ability to train the classifier using genuine coin samples only. In spite of the promising results achieved, the proposed approach is not without shortcomings. As stated above, for each type of the coins, some genuine coin images are needed for training. Yet, for some rare coins, it may not be easy to obtain enough genuine images for training. How to address this issue deserves a closer look and will be the focus of our future work.

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