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NEURAL NETWORK BASED COIN RECOGNITION SYSTEM

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ABSTRACT

Coins are integral part of our day to day life. We use coins everywhere like grocery store, banks, buses, trains etc. So many small money transactions are done through coins. A large number of fake coins are running in market. So it becomes important to develop an automatic fake coins identification technique to identify and remove fake coins from economy. In this paper we have presented a comparative study for it and proposed a Neural Network based fake coin identification technique.

Keywords: Neural Network, Pattern Recognition, Image Processing, Automated Coin Recognition.

I. INTRODUCTION

We cannot imagine our life without coins. We use coins in our daily life almost everywhere like in banks, supermarkets, grocery stores etc. They have been the integral part of our day to day life. So there is basic need of highly accurate and efficient automatic coin recognition system. In-spite of daily uses coin recognition systems can also be used for the research purpose by the institutes or organizations that deal with the ancient coins. There are three types of coin recognition systems available in the market based on different methods:

- Mechanical method based systems
- Electromagnetic method based systems
- Image processing based systems

The mechanical method based systems use parameters like diameter or radius, thickness, weight and magnetism of the coin to differentiate between the coins. But these parameters cannot be used to differentiate between the different materials of the coins. It means if we provide two coins one original and other fake having same diameter, thickness, weight and magnetism but with different materials to mechanical method based coin recognition system then it will treat both the coins as original coin so these systems can be fooled easily.

The electromagnetic method based systems can differentiate between different materials because in these systems the coins are passed through an oscillating coil at a certain frequency and different materials bring different changes in the amplitude and direction of frequency. So these changes and the other parameters like diameter, thickness, weight and magnetism can be used to differentiate between coins. The electromagnetic method based coin recognition systems improve the accuracy of recognition but still they can be fooled by some game coins.

In the recent years coin recognition systems based on images have also come into picture. In these systems first of all the image of the coin to be recognized is taken either by camera or by somescanning. Then these images are processed by using various techniques of image processing like FFT , Gabor Wavelets, DCT, edge detection,

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segmentation, image subtraction , decision trees etc and various features are extracted from the images. Then based on these features different coins are recognized.

II. LITERATURE REVIEW

In 2015[1] S.Mohamedmansoorroomi, R.B. Jayanthi presented Coin detection and recognition using neural networks. Find whether the object is coin or not if so denomination of the coin is found. The Fourier approximation of the coin image is used to reduce the variations on surface of coin such as light reflection effect. Then coins can be distinguished by feeding those features into a multi-layered BP neural network.

In September 2014[2] Sandeep Kaur et al. presented Review on the coin recognition with rotation invariant. A reliable coin recognition system that is based on a polar harmonic transform. Coins are widely used in daily routine at various places like in banks, automated weighing machines, supermarkets, organizations for research purposes. So, there is a basic need to recognize the coin very accurately. There is problem that if coin is rotated at some angle then the system is unable to recognize it so we are going to introduce a new approach for rotation invariant for coin recognition that is if coin image is rotated at some angle it can be recognized and will prove rotation invariant. So, this paper focuses on removing the need of placing coin in particular position by using artificial neural network.

In March 2014[4] Suchikamalik, Parveen Bajaj, Mukhwinder Kaur presented Sample Coin Recognition System using Artificial Neural Network on Static Image Dataset. An algorithm based on unequally spaced frequency fourier transform is proposed for the recognition of coins. The performance of proposed algorithm is measured in terms of mean square error and peak signal to noise ratio.

In 2010[5] CHEN Cai-ming, Zhang Shi-qing,Chen Yue-fen presented A Coin Recognition System with Rotation Invariance. A coin recognition method with rotation invariance. The rotation invariance feature is represented by the absolute value of Fourier coefficients of polar image of the coin on circles with different radii. Moreover, the Fourier approximation of the coin image is used to reduce the variations on surface of coin such as light reflection effect. Then coins can be distinguished by feeding those features into a multi-layered BP neural network. Finally the coin recognition experiments are given to show the effectiveness of the proposed method.

III. PROPOSED METHODOLOGY

A. Literature Survey

B. Purpose the technique using concepts of image processing and neural networks.

C. Artificial neural network

Neural Networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze. This “expert” can then be used to provide projections given new situations of interest and answer "what if" questions. Other advantages include:

- **Adaptive learning**: An ability to learn how to do tasks based on the data given for training or initial experience.

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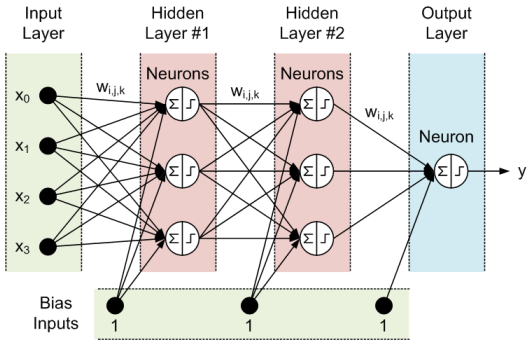
- **Self-Organization**: An ANN can create its own organization or representation of the information it receives during learning time.
- Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.
- **Fault Tolerance via Redundant Information Coding**: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.

D. Using Multiple Hidden Layers:

Multilayer perceptrons using a backpropagation algorithm are the standard algorithm for any supervised learning pattern recognition process and the subject of ongoing research in computational neuroscience and parallel distributed processing. They are useful in research in terms of their ability to solve problems stochastically, which often allows one to get approximate solutions for extremely complex problems like fitness approximation.



5) Binarization / Correlation Approach:

Thresholding (image processing) is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images

6) Feature Extraction:In machine learning, pattern recognition and in image processing, **feature extraction** starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction.

7) Filters/Masking/Labelling

Filters, In image processing filters are mainly used to suppress either the high frequencies in theimage, i.e. smoothing the image, or the low frequencies, i.e. enhancing or detecting edges in theimage. An image can be filtered either in the frequency or in the spatial domain.

Masking, A mask is a filter. Concept of masking is also known as spatial filtering. Masking is also known as filtering. In this concept we just deal with the filtering operation that is performed directly on the image.

IV. CONCLUSIONS

In this paper, existing techniques for coin recognition based on image processing are discussed. The proposed research work is directed towards coin recognition using classification. Further research will be carried out to

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improve the system in terms of speed along with accuracy.This paper presents an over view of available systems and techniques based on image processing to recognise ancient coins and modern coins.

Future scope: There are so many approaches available for recognition of modern coins. But for ancient coins very less work has been done till now because mostly ancient coins found in poor conditions and also the y do not have proper boundary. So, new approaches / techniques can be developed for recognition of ancient coins. Also existing approaches can be extended to increase the accuracy or recognition rate and to make the recognition process real-time.

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