Review Article
A Review on Different Currency Recognition System for Bangladesh India China and Euro Currency

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Abstract: Paper currency recognition is one of the important applications of pattern recognition. This application is used to recognize the currency of different countries. Currency recognition system can be used in many places like Hotels, Shops and Automated Teller Machines etc. The currency recognition system should be able to classify this paper currency to the correct class of paper currencies to which it belongs. This study represents currency recognition system of different countries using different techniques. The paper represents recognition system of different countries like Bangladesh, China, India and recognition system for Euro currency. Different techniques are used to develop these systems like Bangladeshi Currency Recognition System using Negatively Correlated Neural Network, Bangladeshi Currency Recognition System Using Neural Network with Axis Symmetrical Masks and Chinese Currency Recognition System based on BP (Back Propagation) Neural Network Improved by Gene Algorithm, Chinese Currency Recognition by Neural Network, Chinese Currency Recognition based on LBP (Local Binary Pattern). Indian Currency Recognition System based on Heuristic Analysis and Recognition System for Euro using New Recognition Method. This study represents currency recognition system of different countries and method used to develop these systems.

Keywords: Paper currency recognition, recognition system

INTRODUCTION

The currency recognition system is developed to recognize the currency by applying different techniques and methods on currency note. The currency recognition system should be able to classify the paper currency to its correct class. The currency recognition system should be able to recognize the note quickly and correctly. The currency recognition system should be able to recognize currency note from any side. There are different types of currency notes some are old and some are noisy. Therefore, it is not easy to recognize such notes. To overcome this problem currency recognition system is developed.

Currency recognition system can be used in places such as shops, banks counter and automated teller machine, auto seller machines etc. It is not easy for the teller in the bank to recognize different notes so a currency recognition system in the bank can reduce human effort.

We have reviewed currency recognition system developed for different countries. The systems are developed using different methods and algorithms. The benefits of this study for the reader are that this study will provide information to the reader about the currency recognition system of different countries. They can compare the recognition system of different countries. Which methods and algorithms are applied to develop these systems and which countries have currency recognition system.

We are aiming to review recognition system of different countries like Bangladesh, China and India and for Euro currency. For this purpose, we have studied different papers related to currency recognition system and provided a brief review of these systems.

LITERATURE REVIEW

Debnath *et al*. (2010), they had used ensemble neural network for currency recognition. Negative correlation learning is used to train the individual Neural Networks (NNs) in an ENN. There are different types of notes such as noisy and old notes and the machine does not easily recognize such notes. Therefore, a system developed using ENN can identify them easily and correctly. For testing, they had used notes of different dominations, which are of 2, 5, 10, 20, 50, 100 and 500 TAKA. First, they convert the note image into gray scale and then the image is compressed. Then the compressed image is given to system as an input for recognition. The system developed using ENN can easily identify the currency with noise as well as old currency notes. With independent training, there are less chances of misclassification.

Qing and Xun (2010), they had used two problem-solving techniques (Artificial Neural Networks and

Gene Algorithm). Due to the slow convergence and indeterminate initial weights for Back Propagation Neural Networks, they had used Gene Algorithm. The purpose to use the Gene Algorithm is to get the appropriate result of connection weights and network connection. The GA-BP (Gene Algorithm: Back Propagation) takes short training time and a great recognition speed therefore it is used for image processing.

Zhang *et al*. (2003), they had proposed a method to extract the features of RENMINGBI (RMB) currency image. The proposed method used linear transform gray scale image to reduce the noise from image to clear the edges of the image. By using simple statistics, the edges of image are obtained. Then by seizing the obtained edges as input vectors the paper currency is recognized using Back Propagation Neural Network. This method of extracting input vector is simple and has good calculating speed. After experimental tests they get a good ratio of successful recognition.

Jahangir and Raja (2007), they had used neural network recognition method to recognize Bangladeshi currency. They had implemented this method on cheap hardware that can be used in different places. The system takes the image of banknote as an input. The notes are scanned using less expensive sensors. The notes are trained for recognition using Back Propagation algorithm. If the note is flipped, the correct recognition is guaranteed because the axis symmetric mask is used in preprocessing stage. For experiment notes, they used eight notes of TAKA, which were recognized successfully.

Guo *et al*. (2010), they proposed Local Binary Pattern (LBP) algorithm for paper currency recognition. For recognition of currency notes, it is necessary to extract features with good quality. For characteristic extraction, they had proposed LBP algorithm, which is based on LBP method. The LBP method has advantage of simplicity and high speed. This method recognizes currency successfully with a high ratio.

Singh *et al*. (2011), they represent the heuristic analysis of Indian currency notes and the digits of serial number of Indian currency notes to recognize them. To identify a character of currency image the features of that image should be extracted. It is very important to extract features from different notes. To extract correct features of character heuristic analysis are done before extracting features in currency recognition.

Lee and Kims (2003), they had proposed a new point extraction and recognition algorithm for banknotes. For specific point extraction from the banknotes having same color, they had used coordinate data extraction method. For recognition, they trained five neural networks. One for inserting direction and remaining are for face value. The purpose of designing

this algorithm is to reduce the time for recognition. The results from the experiment prove that the proposed method has excellent recognition rate and low training period.

CONCLUSION

In this study, we discussed recognition system of different countries like Bangladesh, China, India and recognition system for Euro currency. They have used different methods and algorithms to develop these systems like Bangladeshi Currency Recognition System using Negatively Correlated Neural Network, Bangladeshi Currency Recognition System Using Neural Network with Axis Symmetrical Masks and Chinese Currency Recognition System based on BP (Back Propagation) Neural Network Improved by Gene Algorithm, Chinese Currency Recognition by Neural Network, Chinese Currency Recognition based on LBP (Local Binary Pattern). Indian Currency Recognition System based on Heuristic Analysis and Recognition System for Euro using New Recognition Method. By using mentioned methods we have observe that good results can be obtained quickly and correctly. Same methods and algorithms could be used to develop the currency recognition system for other countries.

RECOMMENDATIONS

In future, there the currency recognition system of different countries could be discussed. The methods and algorithms they have used to develop those systems and which is the best approach.

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