

Counterfeit Detection using Deep Learning

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Abstract: Detecting counterfeit currency is a critical issue that has gained increasing attention in recent years. Deep learning techniques have shown significant promise in a variety of image processing tasks, including counterfeit currency detection. In this project, we propose a deep learning-based counterfeit currency detection system that uses convolutional neural networks (CNNs) for feature extraction and classification. The proposed system consists of two main phases: training and testing. In the training phase, a dataset of genuine and counterfeit banknotes is used to train the CNN model to distinguish between genuine and counterfeit banknotes. A CNN model extracts features from an input image using convolutional layers and then applies fully connected layers for classification. Experimental results show that the proposed deep learning-based counterfeit currency detection system achieves high accuracy. The system outperforms existing state-of-the-art techniques in terms of detection accuracy, robustness, and real-time performance. In conclusion, it can be said that the proposed system could be a useful tool for preventing the circulation of counterfeit currency and minimizing economic losses. The system can be integrated into various automated teller machines (ATMs) and vending machines to detect counterfeit money in real time.

Keywords: Counterfeit currency, image processing tasks, convolutional neural networks, currency features, accuracy detection

REFERENCES

- [1]. M. Aoba, T. Kikuchi, and Y. Takefuji, "Euro Banknote Recognition System Using a Three-layered Perceptron and RBF Networks", IPSJ Transactions on Mathematical Modeling and its Applications, May 2003.
- [2]. S. Desai, S. Kabade, A. Bakshi, A. Gunjal, M. Yeole, "Implementation of Multiple Kernel Support Vector Machine for Automatic Recognition and Classification of Counterfeit Notes", International Journal of Scientific & Engineering Research, October-2014.
- [3]. C. Gigliarano, S. Figini, P. Muliere, "Making classifier performance comparisons when ROC curves intersect", Computational Statistics and Data Analysis 77 (2014) 300–312.
- [4]. E. Gillich and V. Lohweg, "Banknote Authentication", 2014.
- [5]. H. Hassanpour and E. Hallajian, "Using Hidden Markov Models for Feature Extraction in Paper Currency Recognition.
- [6]. Z. Huang, H. Chen, C. J. Hsu, W. H. Chen and S. Wuc, "Credit rating analysis with support vector machines and neural network: a market comparative study", 2004.
- [7]. C. Kumar and A. K. Dudyala, "Banknote Authentication using Decision Tree rules and Machine Learning Techniques", International Conference on Advances in Computer Engineering and Applications (ICACEA), 2015.
- [8]. M. Lee and T. Chang, "Comparison of Support Vector Machine and Back Propagation Neural Network in Evaluating the Enterprise Financial Distress", International Journal of Artificial Intelligence & Applications 1.3 (2010) 31-43.
- [9]. C. Nastoulis, A. Leros, and N. Bardis, "Banknote Recognition Based on Probabilistic Neural Network Models", Proceedings of the 10th WSEAS International Conference on SYSTEMS, Vouliagmeni, Athens, Greece, July 10-12, 2006.

- [10]. S. Omatu, M. Yoshioka and Y. Kosaka, "Bankcurrency Classification Using Neural Networks", IEEE, 2007.
- [11]. A. Patle and D. S. Chouhan, "SVM Kernel Functions for Classification", ICATE 2013.
- [12]. E. L. Prime and D. H. Solomon, "Australia's plastic banknotes: fighting counterfeit currency.," *Angewandte Chemie (International ed. in English)*, vol. 49, no. 22, pp. 3726–36, May 2010.
- [13]. A. Roy, B. Halder, and U. Garain, "Authentication of currency notes through printing technique verification," *Proceedings of the Seventh Indian Conference on Computer Vision, Graphics and Image Processing -ICVGIP '10*, pp. 383–390, 2010.
- [14]. Tusher Agasti, Gajanan Burand, Pratik Wade and P Chitra – Fake currency detection using image pre-processing 14th ICSET-2017 https://www.researchgate.net/publication/321479332_Fake_currency_detection_using_image_processing
- [15]. F. Takeda, L. Sakoobunthu and H. Satou, "Thai Banknote Recognition Using Neural Network and Continues Learning by DSP Unit", *International Conference on Knowledge-Based and Intelligent Information and Engineering Systems*, 2003.
- [16]. [16] M. Thirunavukkarasu, K. Dinakaran, E.N Satishkumar and S Gnanendra, "Comparison of support r machine(svm) and Back propagation network (bpn) methods in predicting the protein Virulence factors", *Jr. of Industrial Pollution Control* 33(2)(2017)pp 11-19.
- [17]. Eshita pilania, Bhavika arora- Recognition of fake currency Based on Security thread feature of currency international journal of Engineering and computer science, ISSN:2319-7249. <https://www.ijecs.in/index.php/ijecs/article/download/1416/1302/>
- [18]. <https://archive.ics.uci.edu/ml/datasets/banknote+authentication>.