Detecting Currency Notes For Visually Challenged People Using Machine Learning

Yogitha. R[1], Kalaiarasi. G[2], Aishwarya. R[3], Maheswari. M[4], Selvi. M[5]

1,2,3,4,5 Department of Computer Science and Engineering, Sathyabama Institute of Science and Technology.
yogitha.ravi1915@gmail.com

ABSTRACT –

In the current world of cheating andother frauds, people find it very difficult to lead their lives. The same is even worse in the caseof Blind or visually challenged. They face many more challenges in their daily life, especially while dealing with currency and other money relatedissues. In order to help blind people, we are developing a project that helps them identify the denomination of the currency, as there is no brail mark on the currency note. Counterfeit note or fake note is another difficult task to identify, for both healthy and blind person. So, in addition to it we are incorporating fake note detection system, which helps every citizen from verge of being cheated.

Keywords: Fake note detection, currency identification, VGG16, blind people, CNN, ImageProcessing.

INTRODUCTION

Machine Learning is such a man-made scholarly ability, that awards programming applications to wind up being more careful at foreseeing results without being expressly modified to do accordingly.ML calculations utilize apparent information as obligation to expect new yield respects. In neural affiliations, Convolutional neural affiliation (ConvNets or CNNs) is one of the fundamental portrayals to do pictures certification, pictures groupings. Things conspicuous bits of verification, insistence faces, and so on, are a piece of the areas where CNNs are widely utilized.

CNN picture orders takes a data picture, measure it and brains it under express classes (Eg., Dog, Cat, Tiger, Lion). Workstations accepts a to be picture as show of pixels and it relies on the picture objective. In all honesty, critical learning CNN models to plan and test, each information picture will go it through a development of convolution layers with channels (Kernals), Pooling, completely related layers (FC) and apply Softmax capacity to amass an article withprobabilistic attributes some spot in the extent of 0 and 1.

Currency is the methods for trade of articles, products, and so forth money related exchange is a significant piece of our everyday life. With the thought of outwardly debilitated individuals or visually impaired individuals, it is to some degree troublesome assignment to recognize the paper cashas it has same felt with no brail stamping on it. Despite the fact that division dependent on sizemight be distinguished however it is practically hard to recognize whether the note is unique or phony. It is the issue tense to grow such a framework that willensure for outwardly impaired or daze individuals that the money they have is unique or not. Themoney acknowledgment calculation talked about inthis paper utilizing picture preparing depends on an ORB (Oriented fast and Rotated Brief). It is faster and additionally turn invariant. The proposedcalculation shows 90% genuine acknowledgmentrate.

There are two rule approaches for banknote information assortment: one is by utilizing sensor and some electrical part (sensor-based framework) and the other is utilizing camera (vision-based design). Picture assortment structure utilizing TMS320C6416DSK as DSP, a dealing with foundation of banknote picture assortment. The DSP stage combine picture sensor SV253A4, fundamental electronic switch MAX4624,

sensor processor XRD98L23, hold driver SN74HC244. In, the specialists utilize a covering sensor to perceive shades of money note by then being managed by a microcontroller to see and send a revamp sound manual for a toll as sign. The banknote plan system in get money pictures utilizing one dimensional unmistakable light sensor.

LITERATURE SURVEY

ChenHan Yuan in [1] a start to finish technique is required for customized discourse combination framework by consolidating the plans to handle these issues and attempt to make the information assortment task feasible. An incorporated the phonetic/acoustic element extraction of the discourse corpus by receiving appropriate neural organizations can be utilized. Along these lines, the customary semantic element extraction module which depends on the master information to construct could be subbed. In [2] Ram Kumar Karshexplained that quaternion Fourier Mellin change is used in picture hashing, on account of its trademark properties of generosity against turn, scaling, and understanding. The information RGB concealing picture is changed over into a quaternion region, which gives the spatial similarly as color related information. In [3] Jinjiang Li explained the use of picture recovery techniques to choose an enormous number of pictures and utilize co-saliency strategies to identify striking zones of standard shading pictures and partially blind reproduced pictures. As per the location results, a picture with a similar identification result was chosen as the allusion picture. Grayscaling the altogether changed picture, recolor the grayscale picture utilizing the reference picture. In [4] edge data which is determined by Sobel administrator is used for diminishing the curios. The edge-protecting misfortune work, in particular Sobel misfortune is acquainted with accomplish this objective which is explained as L2 standard among the Sobel reactions of the first and the interpreted pictures.

Discourse generators with the MFB approach in [5] require an extra approximately costly vocoder for the preparation cycle. The before and after handling required by the MFB and the vocoder isn't basic to change over man voices, since it is conceivable to utilize just the crude range to produce distinctive pattern of voices with intelligible articulation. Ashwani Kumar explains in [6] ongoing headway in profound learning with picture preparing, empower us to build up this prototype. The prototype takes shading pictures as information and train the mode until the mistake rate is less. To expand the estimated exhibition of the model they have utilized single shot multi-box indicator calculation. Methodology in [7] to get visual data like located individuals seeing pictures, dazzle or outwardly disabled individuals need to utilize material designs materials and should use their touch faculties to peruse and investigate each data on them. In any case, there are constraints to decipher data on material designs with tangible discernment. The perspective on material designs is restricted to the size of an individual's fingertips.

Adiba Zarin [8] states that many note recognition frameworks are available in banks yet they are exorbitant and frequently mistaken. The subject of picture handling, neural organization and machine vision can possibly fundamentally beat this issue. The researcher proposes a prototype contained Optical Character acknowledgment Face Recognition and Hough change calculation. The microprinting, water-imprint, and bright lines highlights of Banknotes are separated for testing of certifiable notes. In [9] Long Zhuo used Wider Separate-then-get-together Network, an as of late proposed profound learning-based information driven shading picture steganalyzer in the field of phony colorized picture recognition. The factual irregularities presented by various programmed colorization techniques can be caught by cutting edge profound learning-based information driven shading picture steganalyzers. Falko Matern in [10,11,12] the thrust is that the basic over an incline subject of a thing shows the orientation of scene light in the image

plane. As opposed to before 2-D lighting techniques, the proposed system is shockingly solid to changes in article tone and assortments in customer commitment, as it works generally speaking thing locale instead of item shapes[13,14,15,16].

PROPOSED SYSTEM

The money acknowledgment utilizing vgg16 calculation is executed with the assistance of MATLAB. The cash acknowledgment framework calculation shows the suitable preprocessing, highlight extraction by means of ORB and highlight coordinating. Classification should be possible with the assistance of hamming distance. Confusion matrix shows number of accurately perceived notes likewise it demonstrates the notes which are not effectively perceived. With the assistance of confusion matrix, precision can be determined. The outcome is incorporated with the assistance of graphical user interface. This framework can be executed where cash related exchanges are included and discovered to be dependable for outwardly impaired individuals[17,18].

ARCHITECTURE DIAGRAM
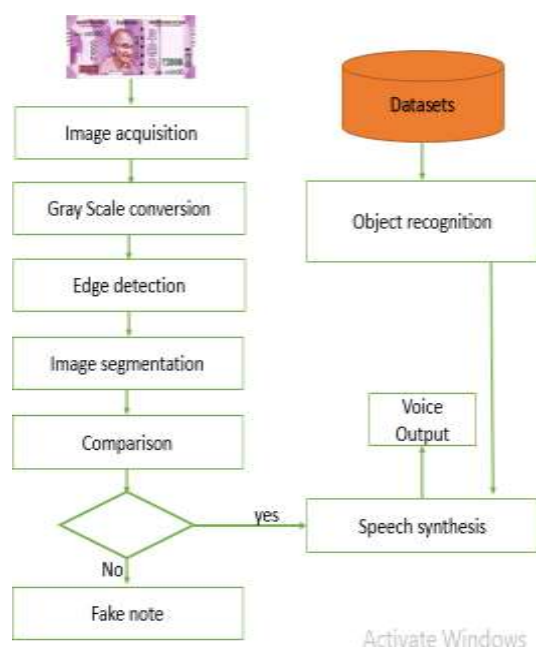
The inputted image undergoes image processing where the raw image is developed further to remove any noises and other disturbances from the image. Then it undergoes grayscale conversion where the image is converted into black and white, to enhance the hidden features inside the image. Also, conversion to grayscale reduces the size of the image.

Further, in the edge detection process, the edges of the note are recognized and presence of any breakage in the note is identified. Under ImageSegmentation, masking of image, that is plotting of it's borders is done. Then the image is compared with the actual data, if there is no match, it is concluded that the inputted image is a fake note, elseif the image matched with a value from actual data set, the object is recognized and speech synthesis forthe same is done.

ALGORITHMS USED

VGG 16

VGG is a contraction for the Visual Geometric Group with 16 layers. These 16 layers hold the workable limits and there are various layers furthermore like the maximum pool layer anyway those don't contain any workable limits. The VGG research pack conveyed a movement of the convolution network model start from VGG11 to VGG19. The rule point of the VGG bundle on significance was to perceive what the significance of convolutional networks means for the precision of the models of tremendous degree picture request and affirmation. The base VGG11 has 8 convolutional layers and 3 totally associated layers when stood out from the most limit VGG19 which has 16 convolutional layers and the 3 totally associated layers. The different assortments of VGGs are exactly the same in the last three totally related layers. The overall construction joins 5 game plans of convolutional layers, followed by a MaxPool. However, what is important is that as the significance fabricates that is as we move from VGG11 to VGG19 progressively more fell convolutional layers are incorporated the five plans of convolutional layers.

MEANSHIFT ALGORITHM

Meanshift come under the class of a grouping calculation interestingly of Unsupervised discovering that relegates the information focuses to the bunches iteratively by moving focuses towards the mode. In that capacity, it is otherwise called the Mode-chasing calculation. Mean-move calculation has applications in the field of picture handling and PC vision.
Mean-move expands upon the idea of piece thickness assessment is sort KDE. Envision that the above information was inspected from a likelihood dispersion. KDE is a strategy to appraise the basic appropriation additionally called the likelihood thickness work for a bunch of information.

It works by putting a piece on each point in the informational index. A portion is an extravagant numerical word for a considerable capacity for the maximum part used in convolution. There are a wide range of sorts of portions, yet the most mainstream one is the Gaussian piece. Including the entirety of the individual parts produces a likelihood surface model thickness work. Contingent upon the part data transmission boundary utilized, the resultant thickness capacity will differ.

MODULES

- Image Processing
- Pre-processing
- Edge detection
- Thresholding
- Segmentation

Image Processing

Image Processing is a technique to develop rough pictures received from cameras/sensors set on satellites for various applications. Various strategies have been made in Image Processing during the last decade. Processing structures are getting notable as a result of basic openness of stunning staff.

Pre-processing

Pre-processing is a process where activities with pictures at the most insignificant level of impression of both information and yield are power pictures. The mark of pre-processing is development of the image data that suppresses unwanted turning. All the undesirable mutilation is taken out in this module.

Edge detection

Edge detection is a picture processing method for finding the limits of articles inside pictures. It works by distinguishing discontinuities in brightness. In this module the edges of the note is distinguished utilizing the idea of progress in brightness.

Thresholding

Programmed thresholding is an extraordinary method to separate valuable data encoded into pixels while limiting foundation commotion. This is refined by using an input circle to upgrade the limit an incentive prior to changing over the first grayscale picture to double. The thought is to isolate the picture into two sections the foundation and frontal area.

Segmentation

The well-known strategies utilized for picture segmentation are: thresholding strategy, edge location based methods, district based procedures, bunching based methods. Picture thresholding is a basic, yet compelling, method of apportioning a picture into a forefront and foundation. This picture examination method is a sort of picture segmentation that segregates protests by changing over grayscale pictures into paired pictures.
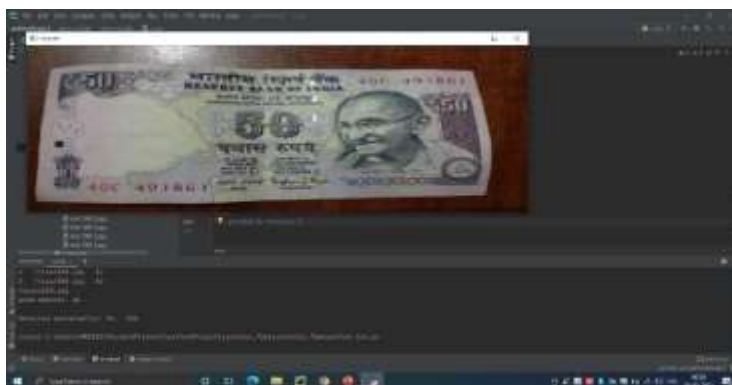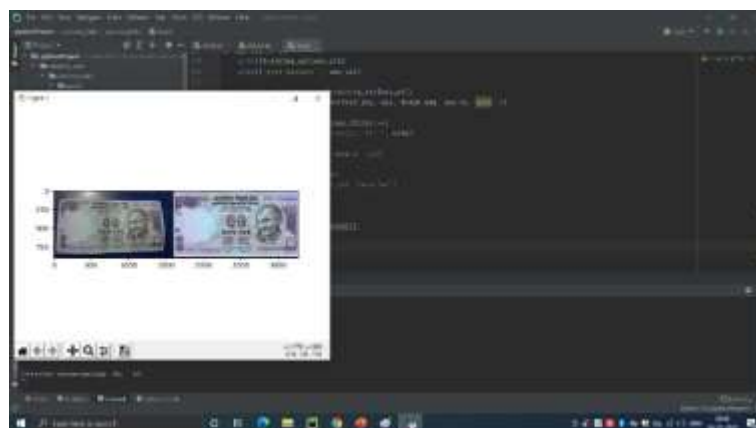

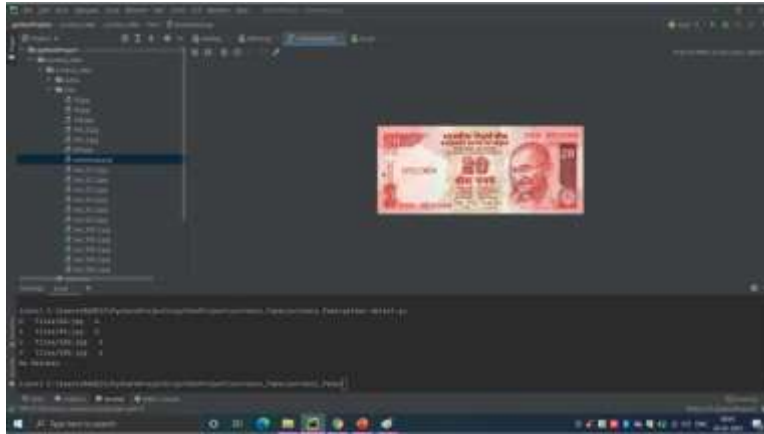*Fig 2: Reviewing Input*

Fig 3: Verifying input with trained datasset
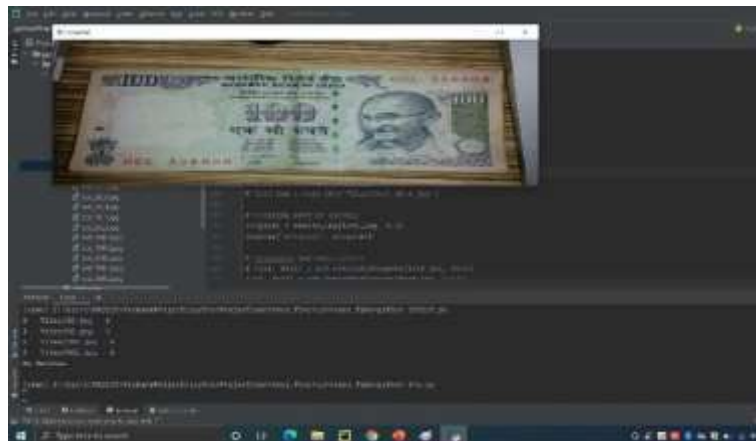
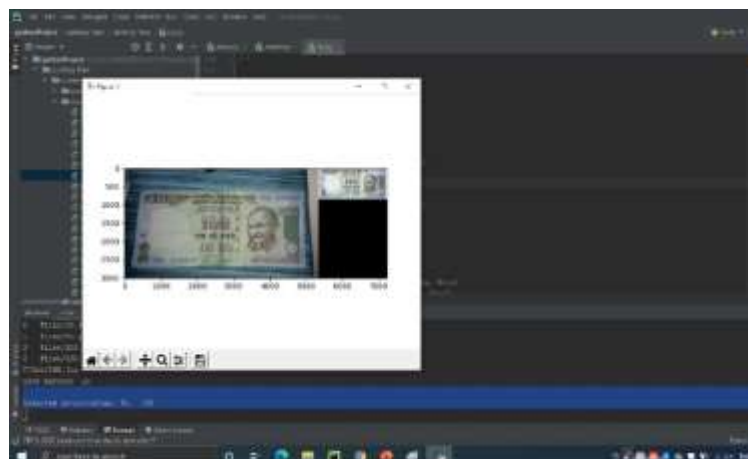*Fig: Sample Fake note*

Fig: Sample Input 2

Fig: Sample Output 2

CONCLUSION AND FUTUREWORK

Identification of currency note for visually challenged people have been made easy, along with detection of fake note, which have been a severe problem in today's world have been solved. The project can be further developed into a real time application or a camera feature add on, that takes a picture of the note and can determine the denomination of the note and to identify the real note.

REFERENCES

1. " Personalized End-to-End Mandarin Speech Synthesis using Small-sized Corpus" - ChenHan Yuan (2020)
2. "Image Authentication based on Q-FMT via Blind Geometric Correction" - Ram Kumar Karsh (2020)
3. "Saliency Consistency-Based Image Re- Colorization for Color Blindness" - Jinjiang Li (2020)
4. "Edge Sensitive Unsupervised Image-to-Image Translation" - Ibrahim Batuhan Akkaya (2020)
5. "Vocoder-free End-to-End Voice Conversionwith Transformer Network" - June-Woo Kim (2020)

6. "An Object Detection Technique For Blind People in Real-Time Using Deep Neural Network"
7. Ashwani Kumar (2020)
8. "Tactile Graphics Exploration Studies Using Fingertip Tracking Based on Colour Markers Detection for Visually Impaired People" - Muhammad Ikmal Hakim Shamsul Bahrin (2019)
9. "A Hybrid Fake Banknote Detection model using OCR, Face Recognition and Hough Features"
10. Adiba Zarin (2019)
11. "Fake Colorized Image Detection with Channel-wise Convolution based Deep-learning Framework"
12. Long Zhuo (2019)
13. "Gradient-Based Illumination Description forImage Forgery Detection" - Falko Matern (2019)
14. Nagarajan, G., R. I. Minu, and A. Jayanthiladevi. "Brain computer interface for smart hardware device." International Journal of RF Technologies 10, no. 3-4 (2019): 131-139.
15. Nirmalraj, S., and G. Nagarajan. "An adaptive fusion of infrared and visible image based on learning of sparse fuzzy cognitive maps on compressive sensing." Journal of Ambient Intelligence and Humanized Computing (2019): 1-11.
16. Nirmalraj, S., and G. Nagarajan. "Biomedical image compression using fuzzy transform and deterministic binary compressive sensing matrix." Journal of Ambient Intelligence and Humanized Computing 12, no. 6 (2021): 5733-5741.
17. Nagarajan, G., Ravi, C.N., Vasanth, K., Immanuel, D.G. and Jebaseelan, S.S., 2016. Dual converter multimotor drive for hybrid permanent magnet synchronous in hybrid electric vehicle. In Proceedings of the International Conference on Soft Computing Systems (pp. 237-249). Springer, New Delhi.
18. Minu, R., Nagarajan, G., Suresh, A. and Devi, J.A., 2016. Cognitive computational semantic for high resolution image interpretation using artificial neural network. BIOMEDICAL RESEARCH-INDIA, 27, pp.S306-S309.
19. Vasanth, K., V. Elanangai, S. Saravanan, and G. Nagarajan. "FSM-based VLSI architecture for the 3× 3

window-based DBUTMPF algorithm." In Proceedings of the International Conference on Soft Computing Systems, pp. 235-247. Springer, New Delhi, 2016.

20. Nagarajan, G. and Minu, R.I., 2016. Multimodal fuzzy ontology creation and knowledge information retrieval. In Proceedings of the International Conference on Soft Computing Systems (pp. 697-706). Springer, New Delhi.

21. Indra, Minu Rajasekaran, Nagarajan Govindan, Ravi Kumar Divakarla Naga Satya, and Sundarsingh Jebaseelan Somasundram David Thanasingh. "Fuzzy rule based ontology reasoning." Journal of Ambient Intelligence and Humanized Computing 12, no. 6 (2021): 6029-6035.