Retraction

Retraction: Automatic Voting System Using Convolutional Neural Network (J. Phys.: Conf. Ser. 1916 012074)

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This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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Automatic Voting System Using Convolutional Neural Network

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Abstract. Electoral fraud or election fraud is an illegal intervention in the process of election, in which voters vote repeatedly for a favored party thereby increasing vote share. In order to conduct elections ethically, this election fraud should be eliminated. Hence, the automatic voting system using Convolutional Neural Network (CNN) has been proposed. The existing systems are time-consuming and difficult to maintain since they include manual processes. Presently different kinds of biometric processes available, among that face detection is the most effective. The proposed system develops an automatic voting system without any human intervention. This system includes a camera for capturing the images of electors, captured images will be stored in the database for analysis. Data analysis will be performed on the database. In this method, all the label images are trained through the convolutional neural network to predict the output by classifying the images. This classification system produces an accuracy of approximately 90%.

Keywords: Convolutional Neural Network, Deep Learning, Election Fraud, Face Recognition.

1. Introduction:
One of the most difficult aspects of running elections is determining if trends in election outcomes that appear anomalous in mathematical calculations and studies are due to election manipulation or strategic activity. Several approaches proposed to preventing voter fraud have recently been suggested. The case study shows that, in 2006 alone, vital allegations of fraud enclosed presidential elections in Italian Republic, Mexico, and several other former Soviet republics. In the United States, considerations are raised relating to all aspects of elections, from elector registration fraud to mechanical device security, particularly since the 2000 presidential election, once accusations of electoral manipulation in Florida were detected round the world.

To reduce and eliminate the frauds and unethical practices during election, an automatic voting system has been proposed using Convolutional neural network, a deep learning technique and it is implemented using python.

2. Literature Review:
This section features and highlights some works related to the automatic voting system. The Fake votes have a distorting and destructive role to play in the polls. Plan named an advanced voting machine using facial recognition would have a more safe and stable voting device. Voting is solely dependent on image processing, in the event of a false vote, the emergency alarm will be triggered and the candidate should be arrested. All should vote their own way to stop a fake vote to elect a leader by preference of voters, says the project leader. The database of the particular citizen, such as the specifics of the voter id and the photos, are stored on a server [1].

This paper proposes a system that is more transparent, safe, and efficient than the existing practice, which has a long queue, long wait times, poor security, and bogus voting, among other drawbacks. For example, the distance between the eyes and the brows does not alter with age. The designed system is also less time-consuming, inexpensive, and a hassle-free way of conducting the election process, making smart voting a better way to vote [2].

Across many developing countries, electronic voting machines have already been developed and are widely used. Radio Frequency Recognition is used by the majority of them. Individual RFID tags do not occur in developed countries. RFID is also a costly choice. Image recognition methods are used in some developed countries to detect people. However, owing to the high cost of the host computer, this issue is yet to be addressed [3-5].

A computerized voting system is yet to be introduced in India. The new voting system is not only insecure but also time-consuming. Every minute, the smart voting system provides modified results. It, therefore, necessitates less capital and manpower. Any year or before an election, the database must be revised to allow for the registration of newly registered voters and the elimination of those who have died from the voting list. Because any operation is carried out over the internet, it is a one-time expenditure for the government. Since data is stored in a single archive, it can be retrieved at any time [6].

Typically, masks are worn to protect the nose and mouth from dirt, bacteria, and viruses entering the respiratory system. In terms of computing time, LBP features outperform Haar-like and HOG features. In the future, we’d like to combine this technology with facial recognition [7-10].

3. Proposed System:

The Proposed system was developed using Python and Jupyter Notebook. The system uses a set of images of voters as input and uses OpenCV and CNN to train the model and to predict output. The main purpose of this system is to ensure that the election is conducted ethically, this is done by taking voters' image as input and the face recognition model is trained using these input dataset. Then the trained model is utilized for detecting voters faces and ensuring that they vote only once. The Figure 1 represents the approach followed for implementing the Automatic Voting System.

4. Design Methodology:

This section discusses the design methodology of the Automatic Voting System using Convolutional Neural Network.

4.1. Input Collection and Creating Dataset:

The images of voters’ is collected by capturing 30 pictures of them and this is considered as the input dataset. The dataset is used for the purpose of training the model. Create the dataset with respect person name with person image are created using opencv module file using python programming. The Figure 2 shows the input collected by capturing voters’ faces.
4.2. Image Preprocessing:

In an image, the recognition of objects should be done. This approach will likely begin with image processing methods such as removal of noise, followed by filtering of (low-level) features to find lines, regions and potentially areas with certain textures. The key is to view these shapes' sets as single objects. The reason is, an Artificial Intelligence concern is that, when seen from different angles or lighting, an object will look different. These functions are often unintentionally done by the human visual system, but a computer requires highly skilled programming and a range of computational power to approach human performance. Manipulating data through many potential strategies in the form of an image. A picture is generally perceived as a two-dimensional sequence of pixel intensities, and such structures as those of a visual print are most frequently depicted. A picture can be interpreted by a computer, either optically or digitally. The below are the three categories of photographs used in digital image processing:

1. Binary Image - Two-level or bi-level images are also known as binary images. This means that a single bit represents each pixel (0 or 1). The two colours of a binary picture are normally black and white, but any two colours can be used.

2. Gray Scale Image - A input layer is a black-and-white digital image in which each pixel's value is a single sample and the intensity is the only data transported. The strength will vary from 0 to 255. The value 0 indicates the lowest value, while 255 indicates the highest value.

3. Color Image - It will always be a digital images in which the value for each pixel is given based on three primary colors Red, Green and Blue. The intensities of each color quantified by a number between 0 and 255.

4.3. Architecture of Convolutional Neural Networks:

Bionic CNN are used for creating an automated voting system. It recommended reducing the number of parameters and modifying the architecture of the network exclusively for vision activities. Typically, convolutional neural networks consist of a series of layers that can be grouped by their features.

1. Convolution Layer - Processing a 2D convolution on the inputs. "Integrated" across "channels" are the "dot products" between weights and inputs. Across receptive fields, filter weights are exchanged. The filter number would have the same "width" as the output volume.

2. Activation Layer - In order to increase the network non-linearity without upsetting the network's responsive fields of convolutional layers, it favors ReLU, resulting in faster training. The vanishing gradient question is discussed by LeakyReLU.

3. Softmax - A special type of activation plate, normally at the end of the FC layer. Outputs can be used as a Normalized exponential function. Produce a discreet and convenient probability distribution vector when combined with cross-entropy loss.

4. Pooling Layer - Convolutional layers provide activation maps, but the pooling layer uses non-linear downsampling on activation maps. Pooling is competitive, Filter sizes are becoming smaller, and pooling is being phased out.

5. FC Layer - It's a typical neural network that can be viewed as the end result of a learning process, where maps extract visual features to the desired outputs. It is typically adaptive to the activities of classification/encoding. The typical output is a vector, which is then passed through softmax to reflect classification trust. Outputs can also be used as "bottleneck".

4.4. Principal Component Analysis:
The main idea behind PCA is to figure out pattern and correlation among different features in the data set by performing dimensionality reduction techniques. This helps to minimize the complexity of high dimensional datasets by transforming it into a small dimensional dataset without any information loss.

The goal of PCA is to show the maximum amount of variance with less number of principal components by identifying a smaller number of uncorrelated data from a huge set of data. By minimizing the complexity of the dataset helps to reduce the time complexity and render data mining easily for the algorithms with dependent factors.

4.4.1. Standardization

Normalization of the set of continuous initial variables contributes equally to the analysis. The importance of standardization before PCA is very susceptible to the variances of the initial variables. That is, where there are large variations in the ranges of the initial variables, certain variables with greater ranges will predominate over those with small ranges (for example, a variable between 0 and 100 will prevail over a variable between 0 and 1), which will lead to partial effects. This problem can be avoided by translating data to equivalent sizes. This can be achieved by subtracting the mean and splitting the standard deviation for each value of each component.

\[ z = \frac{(value - mean)}{standard \ deviation} \]

4.4.2. Covariance Matrix Computation

The covariance matrix computation expresses the correlation between difference variables in a data set. The objective of this is to consider how variables throughout the input data set differ from the average of each other and to understand the connectivity among the variables. Covariance matrix is used here to describe the relationship among the variables.

it is essential to identify the dependent variables since it contains biased and redundant information which decreases the overall performance of the model.

4.4.3. Compute the EigenVectors and EigenValues to identify the principal components

Eigenvectors and Eigenvalues are the linear algebra concepts that we need to compute from the covariance matrix in order to determine the principal components of the data. The key components are new variables that are built as linear combinations or mixtures of the original variables. These variations are performed in such a manner that the new variables (i.e. the key components) are not associated and much of the information in the original variables is compressed or compressed into the first components. So, the theory is 10-dimensional data gives you 10 key components, but PCA is attempting to place as much information as possible in the first component, then maximum remaining information in the second and so on in figure 3, 4 and 5.
**Figure 1.** Flow Diagram for Automatic Voting System.

**Figure 2.** Sample of input dataset.

**Figure 3.** Architecture Diagram of Convolutional Neural Network.
Figure 4. Covariance Matrix for 3-Dimensional Data

\[
\begin{bmatrix}
\text{Cov}(x, x) & \text{Cov}(x, y) & \text{Cov}(x, z) \\
\text{Cov}(y, x) & \text{Cov}(y, y) & \text{Cov}(y, z) \\
\text{Cov}(z, x) & \text{Cov}(z, y) & \text{Cov}(z, z)
\end{bmatrix}
\]

5. Result

The automatic voting system using convolution neural networks takes a custom dataset which consists of voter’s images and the voter’s name as an input. This input is used to train the model using convolutional neural networks. This system eliminates the voting fraud by utilizing the video captured using the webcam. The footage captured using the webcam is compared with the already collected dataset and checks if the voter’s casted his or her vote already. If a new voter is about to vote, the system gets updated. If an already existing voter tries to vote again, the system shows a warning. The list of parties is shown and the voters can select the desired parties. The casted votes are noted, this process makes the voting process easy. The system produces an accuracy of approximately 90% as shown in figure 6, 7 and 8.
Figure 6. Sample of Face Recognition

Figure 7. Sample of Voting Option

Figure 8. Sample of Alert Message
6. Conclusion

The automatic voting system using convolutional neural networks makes the voting process easy as it requires minimum to no human intervention. This Automatic Voting system would take the place of the time-consuming and difficult-to-maintain manual process. Each and every minute, this machine produces modified data. It, therefore, necessitates less capital and manpower. Any year or before an election, the database must be revised to allow for the enrollment of newly registered voters and the removal of those who have died from the voting list. There is no need for an election official, paper ballots, or electronic voting machines in this system; all that is needed is a webcam.

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