MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE FOR AUTOMATING E-GOVERNMENT SERVICES

[1] **RADHA KRISHNA BALUSU,** *SCHOOL OF COMPUTER SCIENCE AND ENGINEERING, VELLORE INSTITUTE OF TECHNOLOGY VELLORE (TN.), INDIA.*
[2] **MEENALOCHANI GANDHAM,** *SCHOOL OF COMPUTER SCIENCE AND ENGINEERING, VELLORE INSTITUTE OF TECHNOLOGY VELLORE (TN.), INDIA.*
[3] **LAVU.SIRIAMMULU,** *SCHOOL OF ELECTRONICS AND COMMUNICATION ENGINEERING, VELLORE INSTITUTE OF TECHNOLOGY VELLORE (TN.), INDIA.*

ABSTRACT: E-Government systems leverage the latest in information and communication technology to help residents and companies get what they need from the government more easily and quickly, with the goal of fostering more participation in and confidence in our democratic system. Supporting and simplifying governance for all stakeholders (government, people, and enterprises) is a primary goal of e-governance initiatives. Using ICTs, these three groups may be linked together and their procedures and activities bolstered. To rephrase, e-governance promotes and facilitates effective government via the use of technological methods. Certificates of all kinds, including those attesting to a person's birth, income, death, or membership in a particular community, may be used on the several websites that make up this endeavour. The citizen's request is sent to the relevant authority for processing. A user's certificate may be issued to them when they have been properly notified. This has the potential to shorten the amount of time spent in line for obtaining necessary government certifications. In addition, government actions should be announced on the official website. The government benefits because it has the potential to give better service in a shorter amount of time, hence improving the efficacy and efficiency of government. Government services may be made more easily available, and transaction costs can be reduced.

INTRODUCTION

Although AI has been around for a while in many theoretical forms and complex systems, it is only with the advent of more powerful computers and vast stores of data that AI has been able to produce really impressive outcomes in a growing number of application areas. Computer vision [1], practical diagnostics [2], natural language analysis [3], deep reinforcement [4], and numerous other fields have all benefited greatly from AI. What we mean by "artificial intelligence" (AI) is the development of software capable of learning and improving upon its own performance in ways that mimic human intellect. An intelligent autonomous system that can do tasks such as driving a vehicle, playing a game, and carrying out a wide variety of complex activities is what we mean when we talk about artificial intelligence (AI), not robotics. Artificial intelligence (AI) is at the crossroads of several other disciplines, such as Machine Learning [5], Deep Learning [6], Natural Languages Processing [3], Context Awareness [7] and Data Security and Privacy [8]. The connections and overlaps between several AI-related disciplines are shown in Figure 1. Machine learning (ML) is the process by which a computer programme or other data processing device learns from examples of past behaviour to generate new, more complex behaviours and to make better judgments when presented with novel data or circumstances. Training a computational model is what makes ML algorithms possible; it involves exposing an algorithm to a huge dataset (such as citizens' demographics) so that the algorithm may make predictions about the program's future behaviour (e.g., employment rates). Supervised learning is a method of teaching a system new skills by observing its performance on an existing dataset. Deep Learning is a branch of machine learning that has evolved as a solution to the problems that plagued previous ML algorithms. Definition: Deep learning is the process of transforming raw data (such as a medical picture) into a target value (such as a diagnosis) by minimising a loss function using an optimization method (such as stochastic gradient descent) [9]. The term "deep learning" refers to the fact that these algorithms, which take their cue from the neural networks inside the human brain, are constructed with a significant number of hierarchy artificial neurons that map the uncooked input data (implanted just at input nodes) to the expected outcome (generated at the output nodes) thru a large amount of layers (recognised as hidden layers). The real act of mapping is carried out by the concealed layers, and consists of a sequence of elementary yet nonlinear arithmetic computations (i.e., a dot product followed by a nonlinear process). One of deep learning's greatest strengths is that it doesn't call for any special "feature engineering." Although machine learning has improved state-of-the-art outcomes in a number of areas, it is clear that there are a number of difficulties in adapting deep learning for use in e-government applications [10]. In the first place, it's becoming harder

to locate professionals of this technology, particularly in developing nations, who can create effective and trustworthy AI applications in light of recent and quick advancements in the machine learning sector. Second, a new set if development issues have been brought about by the project cycle of AI projects, especially those using deep learning. In particular, whereas conventional software development is concerned with satisfying a list of functional and non-functional objectives, deep learning development is concerned with maximising a single measure over a wide range of factors in an inefficient, ad hoc fashion. Third, robust regulations and controls on data privacy and security are necessary for incorporating AI and deep learning technologies into egovernment services. Trust between citizens and governments, openness, and other technical issues in establishing and implementing safe systems are still obstacles to the adoption of specific standards for privacy and data security. E-government is the process of delivering and upgrading government services to individuals and companies via the use of the Internet and other electronic means in an effort to increase efficiency and save costs. It is particularly true for developing nations that e-government plays a crucial role in promoting the economics of the government, population, and industry. It allows for more efficient, transparent, and cost-effective interactions between government and people (G2C), government and corporations (G2B), and inter-agency and relationships (G2G) [11]-[14]. It also enables B2B transactions and tasks and brings consumers closer to businesses (B2C). The long-term objective of e-government is to improve the effectiveness and efficiency of government services while cutting costs. Even more so, there are a number of benefits that may be fostered by adopting e-government applications, such as, but not limited to: By making it simpler to find recent news and alerts, e-government apps and media channels may increase the government's openness on its policy and current initiatives. Access to government services and information using open and simple technology may significantly increase individuals' faith in their government. • Citizen involvement: e-government apps may facilitate citizen involvement in judgement and survey administration, so better reflecting people' perspectives and encouraging their active engagement in shaping their future. There is a positive impact on the environment thanks to the elimination of job postings and the reduced need for energy to power and operate government buildings and processing units that are made possible by the use of e-government services. However, there are still many obstacles to overcome when rolling out e-government apps, such as the ones listed below. • Trust: individuals' trust in government, the quality of internet services, and individual beliefs all have a role in how much they trust these types of services (e.g., there still a large number of citizens who prefer to handle paper applications rather than web services). • Skill gaps: delivering high-quality online services calls on the recruitment of specialists in fields ranging from web development to data privacy and security. There is a lack of accessibility to the web and its services in many developing nations. • Security: cutting-edge security protocols are essential for protecting citizens' personal information and e-government apps. Recent years have seen a rise in the use of e-government services across several nations [15]. Although many studies have been done to improve e-government services, only a handful [16–19] discuss how to automate such services using the latest AI and deep learning technologies. Therefore, it is still crucial to use cutting-edge AI methods and algorithms to solve problems and meet requirements in the realm of e-government. To enhance e-government systems & their interactions with people, we offer a unique paradigm in this study that makes use of current breakthroughs in AI. To start, we suggest a framework for applying AI in the administration of e-government systems, making it more efficient and less labor-intensive. Second, we create and propose a number of deep learning models whose goal is to automate e-government services for Arabic-speaking nations. These services include the identification of hand-written numbers and letters as well as sentiment analysis.

LITERATURE SURVEY

Image identification using deep residual learning. This work was written by K. He, X. Zhang, S. Ren, and J. Sun. Training neural networks with more depth is more challenging. To facilitate the training of nets far deeper than those previously used, we provide a residual learning approach. As an alternative to learning unreferenced functions, we deliberately reformulate the layers such that they learn residual functions in relation to the layer inputs. Here, we provide a large body of empirical data demonstrating that these networks are simpler to optimise and benefit greatly from deeper learning. We test residual networks with up to 152 layers in depth on the ImageNet dataset, which is 8x more than VGG nets [40] but still lower in complexity. Error on the Top - ranked test set is reduced to 3.57% when these residual nets are combined into an ensemble. At the 2015 ILSVRC classification competition, this result came out on top. CIFAR-10 analyses at 100 and 1000 layers are also shown. When it comes to recognising images, several different visual recognition tasks place heavy emphasis on the representation depth. We gain a relative improvement of 28% on the COCO object identification dataset, and this is attributable only to the depth of our representations. We earned first place in the ImageNet detection, Contest localization, COCO detection, and COCO segmentation tasks in the ILSVRC and COCO 2015 competitions1 because to the use of deep residual nets in our submissions.

For voxel-wise detection of cerebral micro haemorrhage, a seven-layer deep neural network built on sparse auto encoder was developed. S.-H. Wang, H. Chen, X.-X. Hou, Y.-D. Zhang, and Y.-D. Zhang are the authors. In this study, we scanned participants using susceptibility weighted imaging to identify voxels inside the brain affected by cerebral microbleed (CMB). The discrepancy in data quality between CMB voxels and other voxels led us to use under sampling as a means of resolving the accuracy conundrum. We created a 7-layer DNN with 1 input, 4 sparse auto encoder, 1 softmax, and 1 output layers. Our simulations indicated that the approach was 95.13 percent sensitive, 93.3 percent specific, and 94.2 percent accurate. Compared to three other methods considered to be cutting-edge, this one produces superior results.

Applying deep recurrent neural networks to the task of video-to-language translation S. Venugopalan, H. Xu, J. Donahue, M. Rohrbach, R. Mooney, and K. Saenko authored the work. Artificial intelligence has been working on a solution to the grounding issue for visual symbols for quite some time. Recent advancements in machine learning for human language anchoring in static pictures suggest that we are getting closer to this aim. In this study, we suggest employing a single deep network with the both recurrent and convolutional structure to do direct video-to-sentence translation. Few datasets of described videos exist, and the majority of available algorithms have only been tested on "play" domains with limited vocabularies. Our approach can generate sentence-level descriptions of open-domain films with big vocabularies by transferring information from 1.2M+ photos with class labels or 100,000+ images with captions. We evaluate our method in comparison to current efforts by looking at measures such language creation, accuracy in subject, verb, or object prediction, and human assessment.

A deep neural network with a tree search algorithm for Go mastery I. Antonoglou, V. Panneershelvam, M. Lanctot, S. Dieleman, D. Grewe, J. Nham, N. Kalchbrenner, I. Sutskever, T. Lillicrap, M. Leach, K. Kavukcuoglu, T. Graepel, and D. Hassabis are the authors. Other names on the list include A. Huang, C. J. Maddison, Due to the vastness of the search space and the complexity of judging board situations and actions, the ancient game of Go has long been considered the most difficult of the retro titles for artificial intelligence. Here, we provide a novel method for playing Go on a computer, one that use "value networks" to assess board situations and "policy networks" to choose moves. These deep networks of neurons are taught to solve problems by a revolutionary mix of supervised learning via human expert games and supervised learning from games involving self-play. The neural nets play Go at the same level as the best Monte Carlo tree - based systems, which mimic thousands of random matches of selfplay without using any lookahead search. We also provide an innovative search technique that integrates Monte Carlo simulation using value or policy networks. With this search technique, our software AlphaGo beat the humans European Go champion 5 games to 0 and 99.8% of other Go systems. A computer programme has now won a full-sized game of Go against a human professional player, something that was expected to be at least a decade distant until this moment.

EXISTING SYSTEM:

In recent years, several nations have begun using e-government services across a wide range of government institutions and standalone software programmes. The use of current breakthroughs in AI and machine learning inside the automating of e-government services is the subject of just a small number of the many research aimed at improving existing e-government offerings. Therefore, the application of cutting-edge AI methods and algorithms to e-government issues remains a pressing need. However, there are still many obstacles to overcome when rolling out e-government apps, such as the ones listed below. When it comes to internet services, citizens' faith in the government, the quality of the services themselves, and their own personal beliefs all play significant roles in determining whether or not people will use them (e.g., there still a large number of citizens who prefer to handle paper applications rather than web services). Expertise gaps: delivering high-quality online services calls for assembling a full team of specialists versed in everything from web design to data protection. A number of developing nations still have serious trouble connecting to the web and using its many services. For the safety of citizens and their personal information, e-government apps must use cutting-edge security protocols.

PROPOSED SYSTEM

This study details a proposal for using Convolution Neural Networks, a kind of Deep Learning algorithm, to automate government functions (CNN). New government programmes may be announced to the public and discussed in online forums, where citizens can provide constructive feedback that the government can use to inform policy choices. We need software with the cognitive abilities of humans in order to automatically identify public opinion regarding schemes, and this includes the ability to determine whether or not the sentiments expressed in online comments are good or negative. The author proposes developing a CNN model that can function like human brains in order to automate the identification of opinions. We can generate a CNN model for any service and programme it to make decisions automatically, eliminating the need for human

intervention. The author has previously described the notion of implementing various models in order to recommend this method; one model can detect or identify human hand-written digits, while another model may detect sentiment from text phrases that can be offered by human concerning government plans. We've included a model that can read emotions in people's faces as part of our extension model. Oftentimes, a person's expressions convey their feelings more accurately than their actual words. As a result, our expanded work can read emotions from people's faces in photos.

MODULES

First, we'll generate a deep learning model for recognising hand-written digits. This model will be a CNN-based hand-written model that will recognise a picture of a digit and predict its name. A CNN model may be created with only two picture types: train images (which include all conceivable forms of digits human can write in all possible ways) and test images (Using test images train model will be tested whether its giving better prediction accuracy). CNN will construct the training model by analysing all of the data in the training set. We will first extract characteristics from the training photos that will be used to construct the model. Additionally, we shall extract features from the test picture and use the trained model to categories it during the testing phase.

Using this module, we can create a deep learning model for detecting sentiment in both written text and visual media. In order to create a text-based sentiment model, we will employ every positive and negative term in the English language. The photographs of people's expressions, both neutral and emotional, will be utilized to build a sentiment analysis system based on face analysis. The train model is applied to every incoming text or picture to determine its emotional tone.

In the third and final section, "Upload Test Image and Identify Digit," we'll use a train model to upload a text image and then recognize a digit.

Fourth, you may share your thoughts on public policy by utilizing the module "Write Your Comment About Government Policies." The collected user feedback will be stored in the app for further analysis.

The fifth module, "See Sentiment from Opinions," allows the user to view all user opinions and the corresponding feelings recognized by the CNN model.

A user may indicate his or her level of satisfaction with a certain government policy by uploading a photo showing his or her facial expression.

Using this module, users may submit a photo of their face and have it analyzed to determine their emotional state.

ALGORITHMS:

CNN:

This study details a proposal for using Convolution Neural Networks, a kind of Deep Learning algorithm, to automate government functions (CNN). New government programmes may be announced to the public and discussed in online forums, where citizens can provide constructive feedback that the government can use to inform policy choices. We need software with the cognitive abilities of humans in order to automatically identify public opinion regarding schemes, and this includes the ability to determine whether or not the sentiments expressed in online comments are good or negative.

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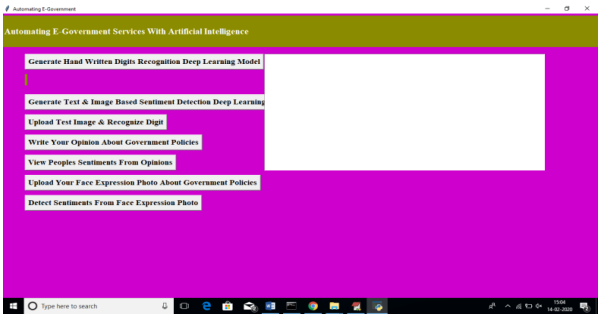
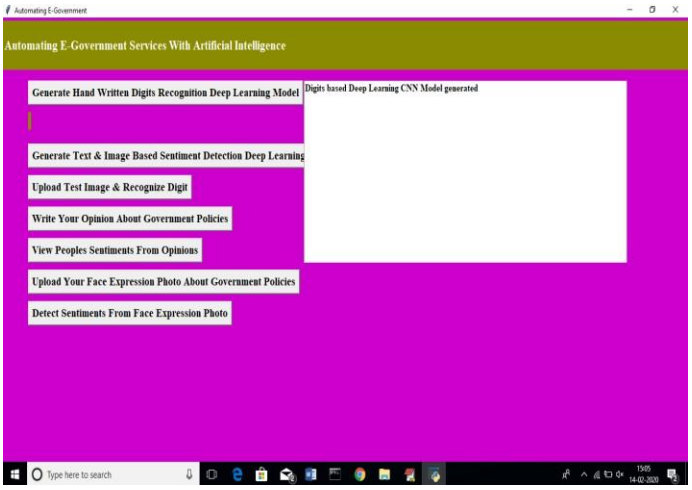
RESULTS:

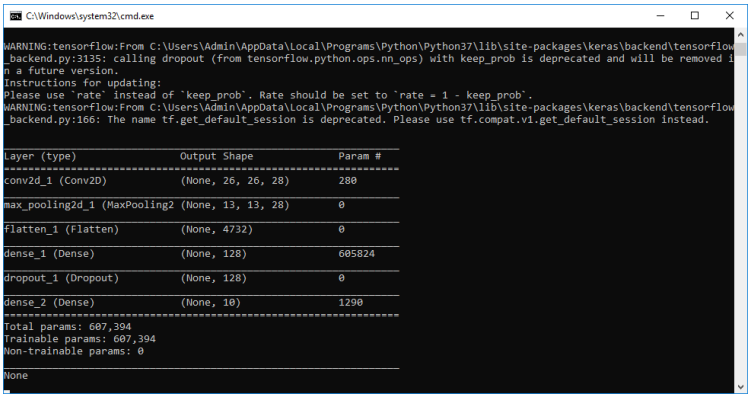
Home Page:



To create a CNN digits recognition model, use the aforementioned page and its button labelled "Generate Hand Write Digit growth Recognition Deep Learning Model."

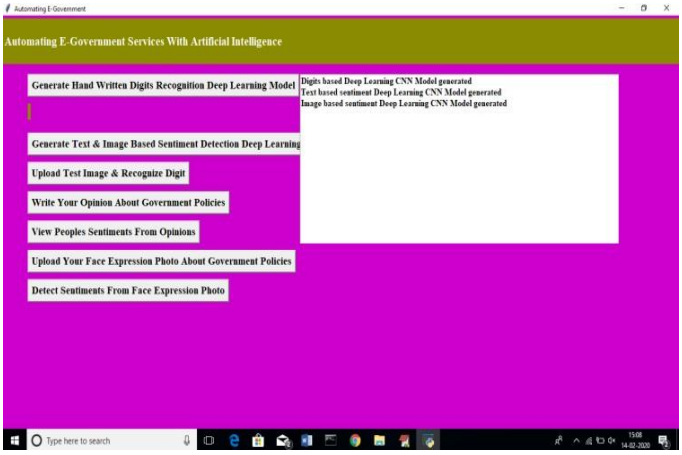


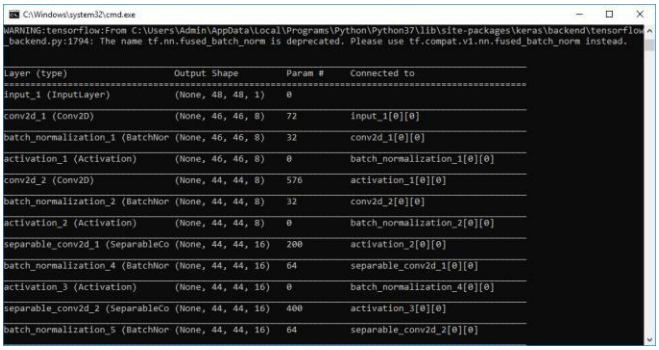
The upper window displays the created model in numerical form, while the black console to the right displays information about each of the CNN layers that made up the model.



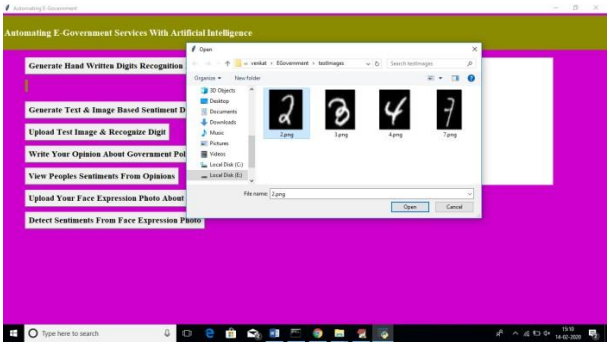
Conv2d, as shown in the screenshot above, indicates that a convolution or CNN has been used to construct the layer of image features. This layer's features were generated using an image size of 26 by 26, whereas subsequent layers used 13 by 13, and so on. Now you can construct a CNN for text and picture based sentiment detection by clicking the "Generate Text & Picture Based Emotion Detection Deep Learning Model" button.

There is a CNN model that uses both text and images, as seen on the previous screen. Details may be found on the blank screen.

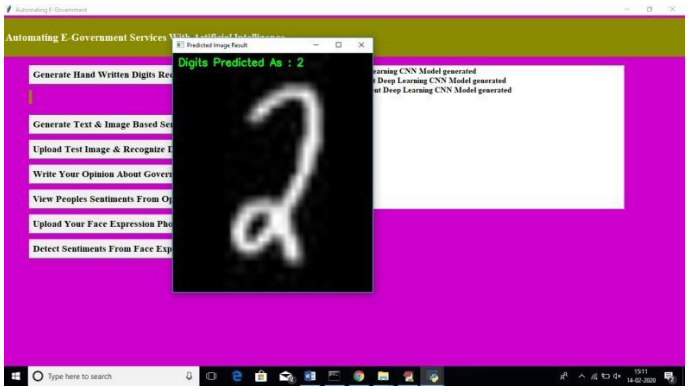




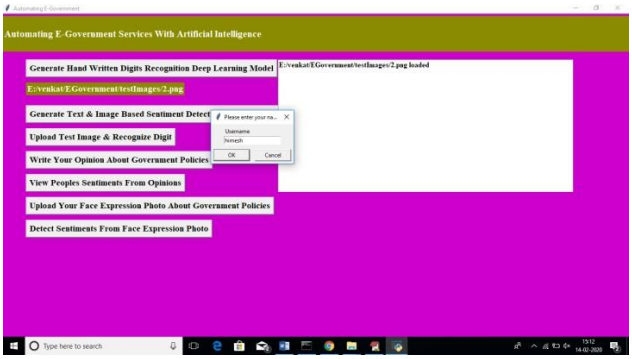
Now you may submit photographs of digits and learn their names by clicking the "Upload Test Picture & Recognize Digit" button. The test mages folder contains all the digit pictures.

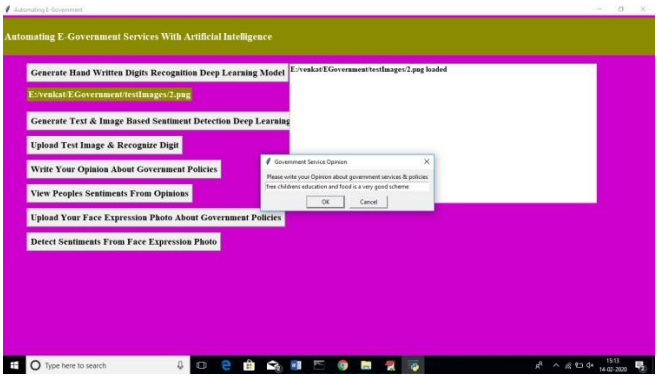


Above, I'm uploading a picture that contains the number 2, and below, you can see the results of the detection.



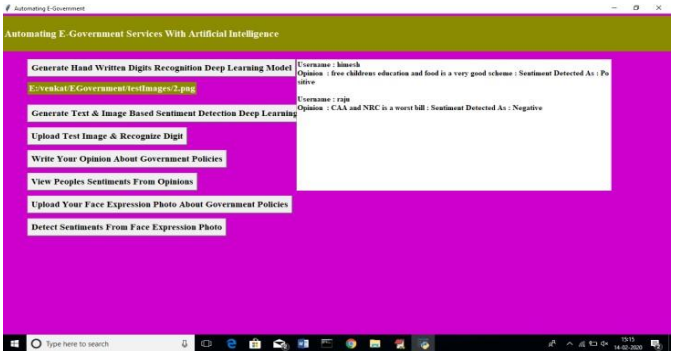
Above, the predicted digits read as follows: 2. To share your thoughts on current government policy, click the tab labelled "Write Your Opinion On Government Policies."



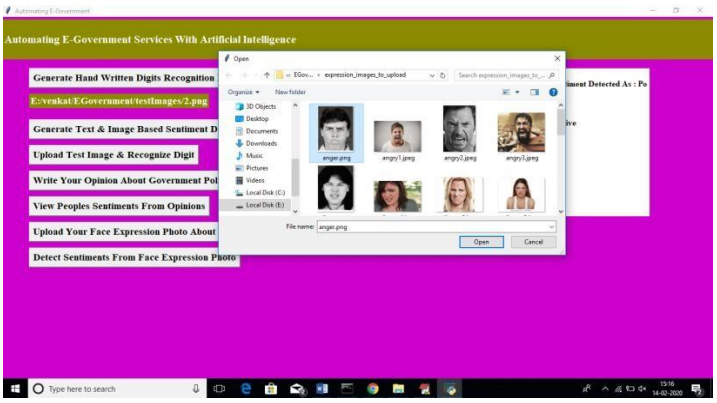


Opinions can only be posted when a person has first entered their username in the box provided above, and then clicked "OK."

My opinion on some scheme is shown in the above screen, and the software attempts to determine if my comment is favourable or bad based on the wording I used. To read comments made by previous users, choose the option to "View People's Sentiments From Opinions."

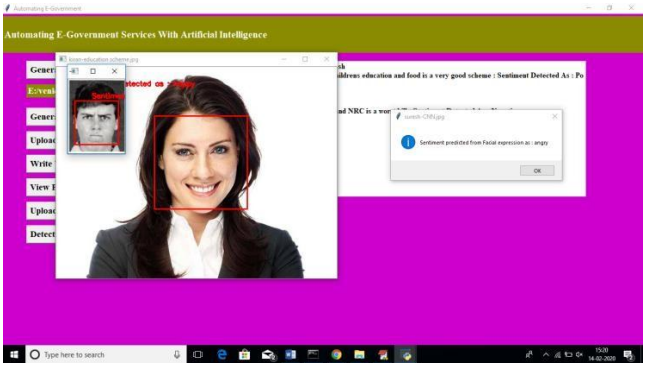


The views of all users are shown in the text space above the screen; the first opinion has a positive sentiment analysis, indicating that the user is pleased with the proposed solution, while the second opinion has a negative sentiment analysis, indicating that the user is dissatisfied. Users may also indicate their mood by uploading a photo of themselves displaying a pleased or furious look.



On the above page, I am attempting to submit a picture of an angry expression before being prompted to provide my user name and the name of the referral programme. furthermore, unlimited people may share their photos. Proceed to the Detect tab and click it.

Click the "Detected Sentiment From Face Expression Photos" button to see all photographs along with their corresponding emotional states.



The emotions associated with each facial expression in the following photograph have been labelled. The results of the survey of public opinion are also shown in the dialogue box. Any amount of comments or photographs of faces may be entered to analyse their emotional content in the same way.

CONCLUSION

As artificial intelligence (AI) and deep learning (DL) continue to grow, we may expect to see more government agencies using these tools to enhance their own operations and offerings to the public. However, there is a long list of problems that prevents widespread use of these technologies, such as a dearth of specialists, computing resources, trust, and interpretability of AI.

In this article, we provide an overview of AI and e-government, explore the global landscape of e-government indexes, and conclude by outlining our recommendations for improving the condition of e-government with a focus on the Gulf States. To better oversee the whole e-government lifecycle, we presented a methodology for managing government information resources. In response, we suggested a suite of deep learning methods that can streamline and automate a variety of online government functions. Then, we presented a sophisticated infrastructure for the research and deployment of AI in e-government.

Overall, this paper aims to increase e-trustworthiness, government's openness, and efficiency by introducing new frameworks and platforms for incorporating cutting-edge AI approaches into government systems and services.

FUTURE ENHANCEMENT

Plans are in the works to examine and improve the protocol for policy change in the future, as opposed to the process reform itself. Different governments have adopted and defined this strategy in an effort to assist the governing style that would boost public confidence, create a more trustworthy and transparent system conducive to democracy, and ultimately lead to more effective governance.

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