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AUTOMATING E GOVERNANCE PROGRAMS FEEDBACK SYSTEM USING ARTIFICIAL INTELLIGENCE

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Abstract

Artificial Intelligence (AI) has recently advanced the state-of-art results in an ever-growing number of domains. However, it still faces several challenges that hinder its deployment in the e-government applications-both for improving the e-government systems and the e-government-citizens interactions. In this paper, we address the challenges of e-government systems and propose a framework that utilizes AI technologies to automate and facilitate e-government services. Specifically, we first outline a framework for the management of e-government information resources. Second, we develop a set of deep learning models that aim to automate several e-government services. Third, we propose a smart e-government platform architecture that supports the development and implementation of AI applications of e-government. Our overarching goal is to utilize trustworthy AI techniques in advancing the current state of e-government services in order to minimize processing times, reduce costs, and improve citizens' satisfaction..

I.INTRODUCTION

Artificial Intelligence (AI) has been around for some decades in several theoretical forms and complicated systems; however, only recent advances in computational powers and big data have enabled AI to achieve outstanding results in an ever-growing number of domains. For example, AI have tremendously advanced the areas of computer vision [1], medical applications [2], natural language processing [3], reinforcement learning [4], and several other domains. AI can be defined as the ability of a computer to imitate the intelligence of human behavior while improving its own performance. AI is not only robotics, rather an intelligent behavior of an autonomous machine that describes the brain of the machine and not its body; it can drive a car, play a game, and perform diverse sophisticated jobs.

AI is a field that falls at the intersections of several other domains, including Machine Learning [5], Deep Learning [6], Natural Languages Processing [3], Context Awareness [7], and Data Security and Privacy [8]. Figure 1 illustrates the intersections and relationship of the AI field with related fields. Machine Learning (ML) is the ability of an algorithm to learn from prior data in order to produce a smart behavior and make correct decisions in various situations that it hasnever faced before. ML algorithms are enabled by training a computational model, which is the process of

ISSN: 2278-4632
Vol-11 Issue-01 2021

exposing an algorithm to a large dataset (e.g., citizens' demographics) in order to predict future behaviors (e.g., employment rates).

The process of learning from prior datasets is known as a supervised learning. Unlike traditional ML algorithms, Deep Learning, a subfield of ML, has emerged to outcome the limitations of prior ML algorithms. Deep learning can be defined as a mapping function that maps raw input data (e.g., a medical image) to the desired output (e.g., diagnosis) by minimizing a loss function using some optimization approach, such as stochastic gradient descent (SGD) [9].

Deep learning algorithms,inspired by the neural networks in the human brain, are built with a large number of hierarchical artificial neural networks that map the raw input data (inserted at the input layer) to the desired output (produced at the output layer) through a large number of layers (known as hidden layers), and thus the name deep learning. The hidden layers are responsible for the actual mapping process, which is a series of simple but nonlinear mathematical operations (i.e., a dot product followed by a nonlinear process). The main advantage of deep learning is that it does not require feature engineering.

Despite the fact that deep learning has improved the state-of-art results in several domains, it is still evident that e-government applications face several challenges regarding adapting deep learning [10]. First, given the recent and rapid advances in the deep learning domain, it is becoming more difficult to find experts of this technology who are capable of developing efficient and reliable AI applications, especially in third world countries.

Second, the development lifecycle of AI projects, specially deep learning, has introduced a new set of development challenges. In particular, traditional software development focuses on meeting a set of required functional and non-functional requirements; in contract, deep learning development focuses on optimizing a specific metric based on a large set of parameters, which is done in a unsystematic search approach. Third, integrating AI and deep learning applications in e-government services requires strong policies and measures on data security and privacy.

However, there are still challenges that hinder the creation of concrete standards for data security and privacy, including citizen-government trust, transparency, and other technical difficulties related to developing and implementing secure systems. E-government is the application of employing advanced electronic techniques–and web services–to present, exchange, and advance the government's services for citizens and businesses with a goal of improving the productivity while reducing the cost.

E-government plays a critical role in advancing the economy of the government, citizens, and industry, especially for developing countries. It facilitates the business-to-business transactions and tasks (B2B), brings customers closer to businesses (B2C), allow productive interactions between the

ISSN: 2278-4632
Vol-11 Issue-01 2021

government and citizens (G2C), government and enterprises (G2B), and inter-agency and relationships (G2G) in more convenient, transparent and economic ways [11]–[14].

The ultimate goal of the e-government is to enhance the quality and efficiency of the government services while reducing cost.

Moreover, implementing e-government applications can foster several other advantages including, but not limited to, the following:

• Transparency: e-government applications and media outlets can enhance the government transparency on its policies and ongoing projects providing easier access to up-to-date news and notifications.

• Trust: providing access to services and government information via transparent and easy-to-use technologies can critically enhance the trust between citizens and government.

• Citizen participation: e-government applications can ease the process of involving citizens in decision-making and conducting surveys, which can reflect the citizens' opinions and improve their participation in building their future.

• Environment support: e-government services eliminate large amounts of paper applications and energy requirements for running and operating facilities and processing units leading to supporting the environment. In contrast, implementing e-government applications still faces several challenges, including the following:

• Trust: trusting online services depends heavily on a couple of factors including, the citizens trust in the government itself, the quality of the online services, and the personal believes (e.g., there still a large number of citizens who prefer to handle paper applications rather than web services).

• Lack of experts: implementing high-quality online services requires the establishment of the right team of experts that covers all involved practice areas from web development to security and privacy.

• Inaccessibility: several third world countries still face significant issues on accessing the internet and its services.

• Security: state-of-the-art security measures are required to secure e-government applications and the citizen's privacy.

Recently, many countries have adopted e-government services in various departments and many autonomous applications [15]. While there are several studies conducted for enhancing e-government services, only a few of them address utilizing recent advances in AI and deep learning in the automation of e-government services [16]–[19]. Therefore, there is still an urgent need to utilize state-of-the-art AI techniques and algorithms to address e-government challenges and needs.

ISSN: 2278-4632
Vol-11 Issue-01 2021

In this paper, we propose a novel framework that utilizes recent advances in AI to improve the e-government systems and their interactions with the citizens. First, we propose a framework to automate and facilitate the management of e-government systems using AI techniques. Second, we develop and present several deep learning models that aim at automating e-government services for Arabic speaking countries including automatic recognition of hand-written digits and letters and sentiment analysis.

Third, we propose an platform for smart e-government services development and implementation. The rest of this paper is organized as follows: Section two presents the current state of the national and international e-government performance indices. Section three proposes an advanced management framework for e-government information resources. Section four presents our deep learning models. Section five suggests a platform for smart e-government services. The conclusion comes in the sixth Section.

II .LITERATURE SURVEY

2.1 Deep residual learning for image recognition

Authors: K. He, X. Zhang, S. Ren, and J. Sun

Deeper neural networks are more difficult to train. We present a residual learning framework to ease the training of networks that are substantially deeper than those used previously. We explicitly reformulate the layers as learning residual functions with reference to the layer inputs, instead of learning unreferenced functions. We provide comprehensive empirical evidence showing that these residual networks are easier to optimize, and can gain accuracy from considerably increased depth. On the ImageNet dataset we evaluate residual nets with a depth of up to 152 layers - 8× deeper than VGG nets [40] but still having lower complexity.

An ensemble of these residual nets achieves 3.57% error on the ImageNet test set. This result won the 1st place on the ILSVRC 2015 classification task. We also present analysis on CIFAR-10 with 100 and 1000 layers. The depth of representations is of central importance for many visual recognition tasks. Solely due to our extremely deep representations, we obtain a 28% relative improvement on the COCO object detection dataset. Deep residual nets are foundations of our submissions to ILSVRC & COCO 2015 competitions1, where we also won the 1st places on the tasks of ImageNet detection, ImageNet localization, COCO detection, and COCO segmentation.

2.2 Sevenlayer deep neural network based on sparse autoencoder for voxelwise detection of cerebral microbleed. Authors: Y.-D. Zhang, Y. Zhang, X.-X.Hou, H. Chen, and S.-H. Wang,

In order to detect the cerebral microbleed (CMB) voxels within brain, we used susceptibility weighted imaging to scan the subjects. Then, we used undersampling to solve the accuracy paradox

ISSN: 2278-4632
Vol-11 Issue-01 2021

caused from the imbalanced data between CMB voxels and non-CMB voxels. we developed a seven-layer deep neural network (DNN), which includes one input layer, four sparse autoencoder layers, one softmax layer, and one output layer. Our simulation showed this method achieved a sensitivity of 95.13%, a specificity of 93.33%, and an accuracy of 94.23%. The result is better than three state-of-the-art approaches.

2.3 Translating videos to natural language using deep recurrent neural networks Authors: S. Venugopalan, H. Xu, J. Donahue, M. Rohrbach, R. Mooney, and K. Saenko,

Solving the visual symbol grounding problem has long been a goal of artificial intelligence. The field appears to be advancing closer to this goal with recent breakthroughs in deep learning for natural language grounding in static images. In this paper, we propose to translate videos directly to sentences using a unified deep neural network with both convolutional and recurrent structure. Described video datasets are scarce, and most existing methods have been applied to toy domains with a small vocabulary of possible words. By transferring knowledge from 1.2M+ images with category labels and 100,000+ images with captions, our method is able to create sentence descriptions of open-domain videos with large vocabularies. We compare our approach with recent work using language generation metrics, subject, verb, and object prediction accuracy, and a human evaluation.

2.4 Mastering the game of Go with deep neural networks and tree search Authors: D. Silver, A. Huang, C. J. Maddison, A. Guez, L. Sifre, G. van den Driessche, J. Schrittwieser, 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

The game of Go has long been viewed as the most challenging of classic games for artificial intelligence owing to its enormous search space and the difficulty of evaluating board positions and moves. Here we introduce a new approach to computer Go that uses ‘value networks’ to evaluate board positions and ‘policy networks’ to select moves. These deep neural networks are trained by a novel combination of supervised learning from human expert games, and reinforcement learning from games of self-play. Without any lookahead search, the neural networks play Go at the level of state-of-the-art Monte Carlo tree search programs that simulate thousands of random games of self-play.

We also introduce a new search algorithm that combines Monte Carlo simulation with value and policy networks. Using this search algorithm, our program AlphaGo achieved a 99.8% winning rate against other Go programs, and defeated the human European Go champion by 5 games to 0.

ISSN: 2278-4632
Vol-11 Issue-01 2021

This is the first time that a computer program has defeated a human professional player in the full-sized game of Go, a feat previously thought to be at least a decade away.

III. EXISTING SYSTEM:

Recently, many countries have adopted e-government services in various departments and many autonomous applications . While there are several studies conducted for enhancing e-government services, only a few of them address utilizing recent advances in AI and deep learning in the automation of e-government services. Therefore, there is still an urgent need to utilize state-of-the-art AI techniques and algorithms to address e-government challenges and needs.

In contrast, implementing e-government applications still faces several challenges, including the following:

Trust: trusting online services depends heavily on a couple of factors including, the citizens trust in the government itself, the quality of the online services, and the personal believes (e.g., there still a large number of citizens who prefer to handle paper applications rather than web services).

Lack of experts: implementing high-quality online services requires the establishment of the right team of experts that covers all involved practice areas from web development to security and privacy.

Inaccessibility: several third world countries still face significant issues on accessing the internet and its services.

Security: state-of-the-art security measures are required to secure e-government applications and the citizen's privacy.

PROPOSED SYSTEM

In this paper author describing concept to automate government services with Artificial Intelligence technology such as Deep Learning algorithm called Convolution Neural Networks (CNN). Government can introduce new schemes on internet and peoples can read news and notifications of such schemes and then peoples can write opinion about such schemes and this opinions can help government in taking better decisions. To detect public opinions about schemes automatically we need to have software like human brains which can easily understand the opinion which peoples are writing is in favour of positive or negative.

To build such automated opinion detection author is suggesting to build CNN model which can work like human brains. This CNN model can be generated for any services and we can make it to work like automated decision making without any human interactions. To suggest this technique author already describing concept to implement multiple models in which one model can detect or recognize human hand written digits and second model can detect sentiment from text sentences which can be given by human about government schemes. In our extension model we added another

ISSN: 2278-4632
Vol-11 Issue-01 2021

model which can detect sentiment from person face image. Person face expressions can describe sentiments better than words or sentences. So our extension work can predict sentiments from person face images.

IV. MODULES

1)Generate Hand Written Digits Recognition Deep Learning Model: using this model we are building CNN based hand written model which take digit image as input and then predict the name of digit. CNN model can be generated by taking two types of images called train (train images contain all possible shapes of digits human can write in all possible ways) and test (Using test images train model will be tested whether its giving better prediction accuracy). Using all train images CNN will build the training model. While building model we will extract features from train images and then build a model. While testing also we will extract features from test image and then apply train model on that test image to classify it.

2) Generate Text & Image Based Sentiment Detection Deep Learning Model: using this module we will generate text and image based sentiment detection model. All possible positive and negative words will be used to generate text based sentiment model. All different types of facial expression images will be used to generate image based sentiment model. Whenever we input text or image then train model will be applied on that input to predict its sentiments.

3) Upload Test Image & Recognize Digit: By using this module we will upload text image and apply train model to recognize digit.

4) Write Your Opinion About Government Policies: using this module we will accept user's opinion and then save that opinion inside application to detect sentiment from opinion.

5) View Peoples Sentiments From Opinions: using this module user can see all users opinion and their sentiments detected through CNN model.

6) Upload Your Face Expression Photo About Government Policies: using this module user will upload his image with facial expression which indicates whether user is satisfy with this scheme or not.

Detect Sentiments From Face Expression Photo: using this module different users can see the facial expression image and detected sentiment which is uploaded by past users

ALGORITHMS:

CNN:

In this paper author describing concept to automate government services with Artificial Intelligence technology such as Deep Learning algorithm called Convolution Neural Networks (CNN). Government can introduce new schemes on internet and peoples can read news and notifications of such schemes and then peoples can write opinion about such schemes and this

ISSN: 2278-4632
Vol-11 Issue-01 2021

opinions can help government in taking better decisions. To detect public opinions about schemes automatically we need to have software like human brains which can easily understand the opinion which peoples are writing is in favour of positive or negative.

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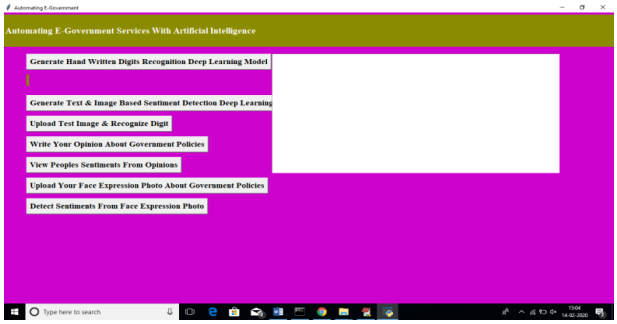
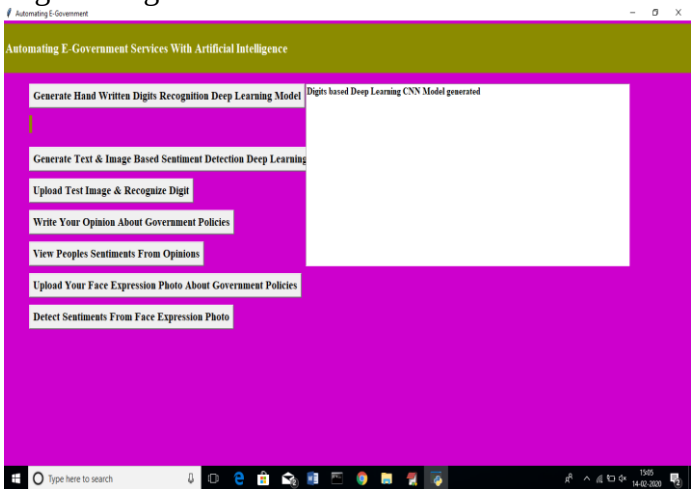
VII. RESULTS:

Home Page:

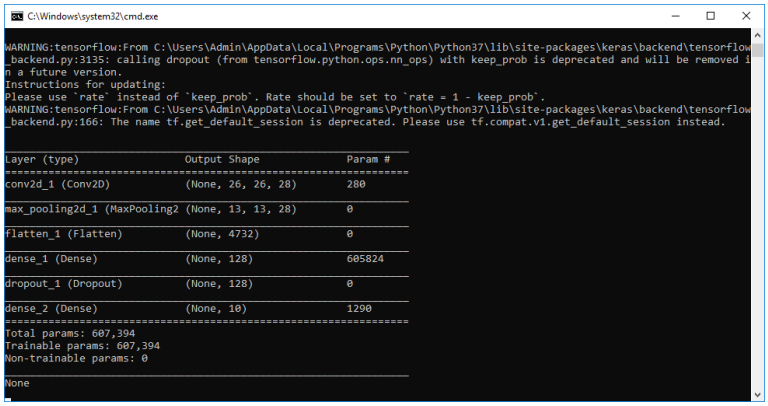


In above screen click on 'Generate Hand Written Digits Recognition Deep Learning Model' button to generate CNN digits recognition model

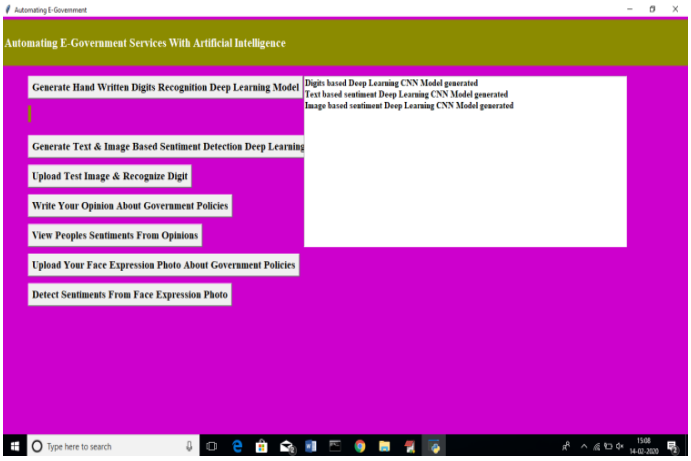


In above screen we can see digits model generated and CNN layer details you can see black console

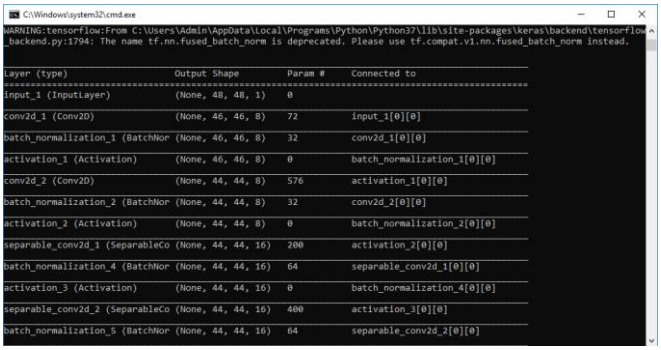
ISSN: 2278-4632
Vol-11 Issue-01 2021



In above screen we can see Conv2d means convolution or CNN generate image features layer from different size as first layer generate with image size 26, 26 and second generated with 13 and 13 and goes on. Now click on 'Generate Text & Image Based Sentiment Detection Deep Learning Model' button to generate CNN for text and image based sentiment detection model.



In above screen we can see text and image based CNN model generated. See black screen for more details



Now click on 'Upload Test Image & Recognize Digit' button to upload digit images and to get name of that digit. All digit images saved inside testImages folder

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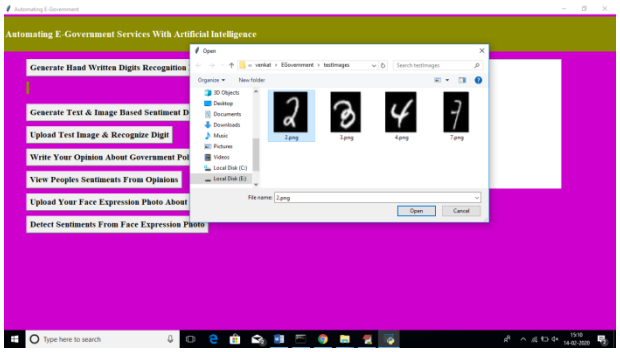
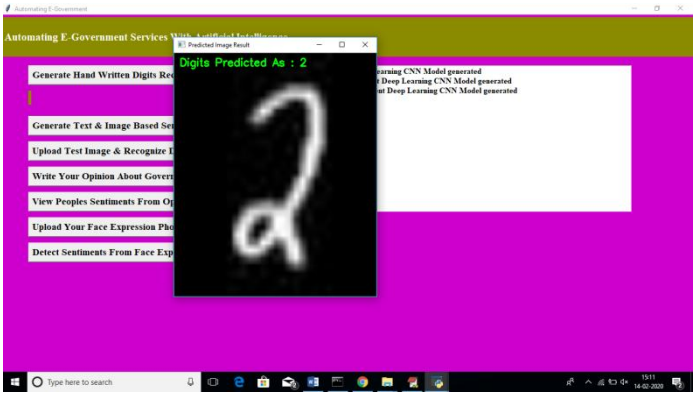
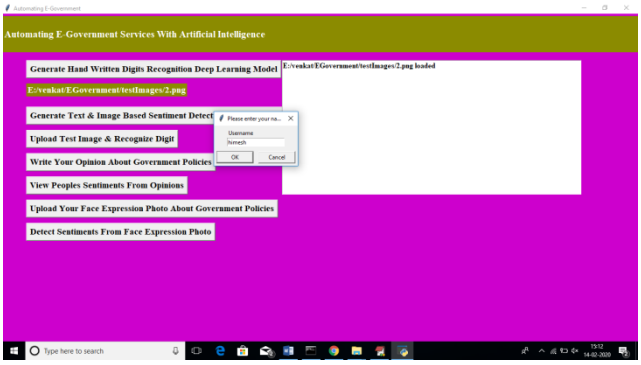


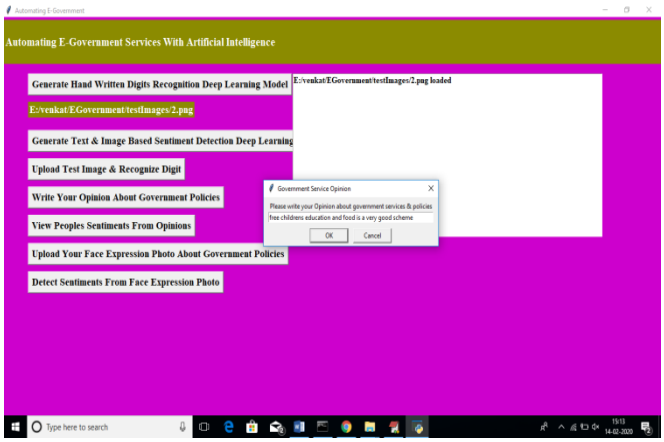
In above screen I am uploading image which contain digit 2 and below is the output of detection



I n above screen we can see Digits Predicted as: 2. Now click on 'Write Your Opinion About Government Policies' button to write some comments on government policy

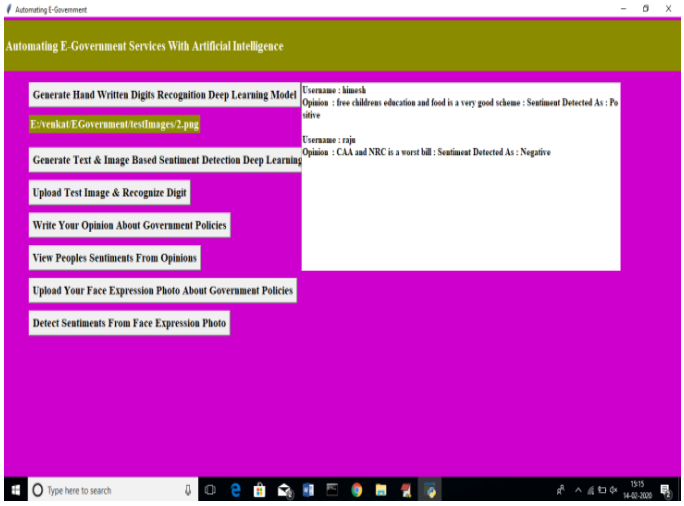


In above screen before writing opinions we need to write username after writing username click ok button to get below screen

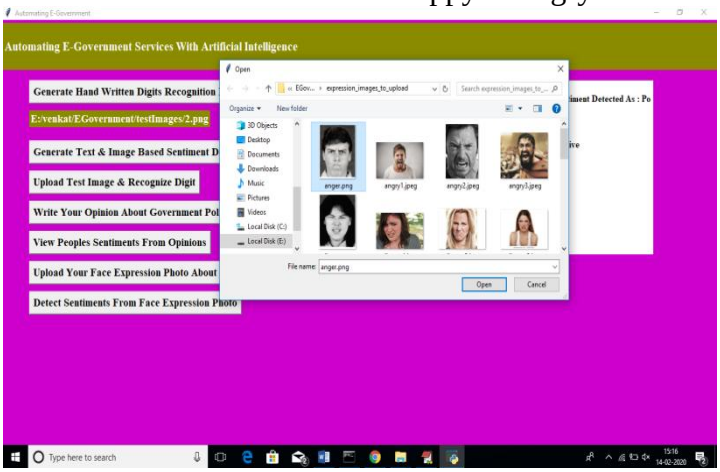


ISSN: 2278-4632
Vol-11 Issue-01 2021

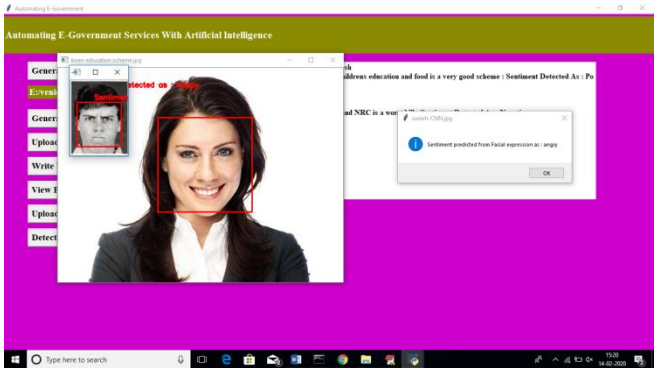
In above screen I wrote some comment on some scheme and application detect sentiment from it as positive or negative. Now click on 'View Peoples Sentiments From Opinions' button to view all opinions from past users.



In above screen text area we can see opinions from all users and in first opinion we got sentiment detected as positive which means user is satisfy with that scheme and for second opinion we got sentiment as negative which means user not happy. Similarly user can upload their image with facial expression which describe whether user is happy or angry



In above screen I am uploading one anger face image and then application ask to write username and referring scheme name. similarly any number of users can upload their images. Now click on 'Detect Sentiments From Face Expression Photo' button to get all images and its detected sentiments



ISSN: 2278-4632
Vol-11 Issue-01 2021

In above screen we can see all images with facial expression are identified with their sentiments. In dialog box also we can see sentiment result. Similarly you can enter any number of comments or facial images to detect their sentiments

VIII. CONCLUSION

With the recent advances in AI and deep learning technologies, more government agencies are starting to use such technologies to improve their systems and services. However, a large set of challenges hinder the adoption of such technologies, including the lack of experts, computational resources, trust, and AI interpretability.

In this paper, we introduced the definitions of artificial intelligence and e-government, briey discussed the current state of e-government indices around the world, and then proposed our solutions to advance the current state of e-government, considering the Gulf Countries as a case study. We proposed a framework for management of government information resources that help manage the e-government lifecycle end-to-end. Then, we proposed a set of deep learning techniques that can help facilitate and automate several e-government services. After that, we proposed a smart platform for AI development and implementation in e-government.

The overarching goal of this paper is to introduce new frameworks and platform to integrate recent advances in AI techniques in the e-government systems and services to improve the overall trust, transparency, and eficiency of e-government.

FUTURE ENHANCEMENT

Future Enhancement is being planned to further analyze and enhance the protocol on reforming policies rather than reforming the process. This approach has been implemented and articulated around the world by different governments to facilitate the governing approach which will increase the public trust and establish a more reliable and transparent system that promotes democracy and provides the more efficient government..

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