Automating E-Government Services With Machine Learning And Artificial Intelligence

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Abstract:

Recently, advances in artificial intelligence (AI) have improved state-of-the-art outcomes in an increasing number of disciplines. Nevertheless, a number of obstacles still need to be overcome before it can be used in e-government applications to enhance citizen-government relations as well as e-government systems. In this study, we explore the issues with e-government systems and provide a paradigm for automating and facilitating e-government services using artificial intelligence (AI) technology. In particular, we should lay up a framework for the administration of information resources for e-government. Secondly, we create a collection of deep learning models with the intention of automating various e-government functions. Third, we suggest an intelligent e-government platform design that facilitates the creation and use of e-government AI applications. Our main objective is to enhance the status of e-government services by using reliable AI approaches to save costs, speed up processing, and increase public happiness.

1. INTRODUCTION

Although artificial intelligence (AI) has been present for a few decades in various theoretical forms and complex systems, it has only recently been able to produce remarkable outcomes in an increasing number of sectors because to developments in massive data and computer capacity. Artificial intelligence (AI) has significantly progressed several fields, including computer vision [1], natural language processing [3], medical applications [2], reinforcement learning [4], and numerous others. Artificial intelligence (AI) is the capacity of a computer to mimic human intellect and behavior while simultaneously enhancing its own capabilities. Artificial Intelligence (AI) is not only robotics; rather, it is the intelligent behavior of an autonomous machine that characterizes the machine's brain rather than its body. An AI may drive a vehicle, play games, and carry out a variety of complex tasks. The fields of artificial intelligence (AI) and machine learning (ML), deep learning (DL), natural language processing (NLP), context awareness (CA), and data security and privacy (DI) all cross with one another. The relationships and crossings between the AI field and related fields are shown in Figure 1. The capacity of an algorithm to learn from previous data in order to generate intelligent behavior and make the right choices in a variety of scenarios that it has never seen before is known as machine learning (ML). Training a computational model is the process of exposing an algorithm to a big dataset (e.g., citizens' demographics) in order to predict future behaviors (e.g., employment rates). This allows ML algorithms to function. Supervised learning is the process of learning from earlier datasets. A branch of machine learning called deep learning has arisen to overcome the shortcomings of earlier ML algorithms, in contrast to regular ML methods. Deep learning may be defined as a mapping function that uses an optimization technique like stochastic gradient descent (SGD) to minimize a loss function in order to convert raw input data, like a medical picture, to the intended output, like a diagnosis [9]. Deep learning algorithms, inspired by the neural networks in the human brain, are built with a large number of hierarchical articial 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 actual mapping process, which consists of a sequence of straightforward yet nonlinear mathematical operations (a dot product followed by a nonlinear process), is carried out by the hidden layers. Deep learning's primary benefit is that feature engineering is not necessary. Even though deep learning has raised the bar for state-of-the-art outcomes in a number of fields, e-government applications still need to overcome a number of obstacles in order to integrate deep learning [10]. First off, it is becoming harder to find deep learning professionals that can create dependable and efficient AI applications, particularly in developing nations, due to the field's recent and quick advancements. Secondly, a new set of development issues has been brought about by the lifetime of AI projects, particularly those using deep learning. Specifically, deep learning development in a contract focuses on maximizing a specific measure based on a vast number of factors, which is done in an ad hoc manner. In contrast, conventional software development is primarily concerned with satisfying a list of needed functional and non-functional criteria. Third, stringent data security and privacy regulations and procedures are necessary for the integration of AI and deep learning technologies in e-government services. The development of real guidelines for data security and privacy is still hampered, nevertheless, by issues with transparency, citizen-government trust, and other technological difficulties in creating and executing safe systems.

2. Literature Survey

A Deep Learning System for Restaurants to Score Their Face Expressions

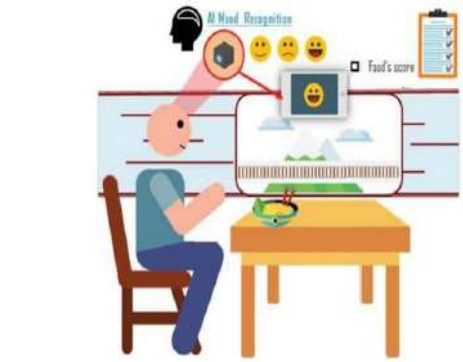
Chang Wan-Jung; Schmelzer Miriam; Florian Kopp; Hsu Chia-Hao; Su Jian-Ping; Chen Liang-Bi; Chen Ming-Che Automated and unmanned restaurant appeal has surged in recent times. Customers' opinions cannot be directly seen in order to learn about their experiences with the restaurant concept since staff members are not there. This research provides a face expression detection grading system using pre-trained convolutional neural network (CNN) models for this purpose. It consists of a web server, an AI server that has already been taught, and an Android mobile application. It is intended that ratings be given to both the cuisine and the setting. Currently, the rating system 2.1 provides three expressions: neutral, dissatisfied, and pleased. "Recognizing action units for facial expression analysis," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 23, no. 2, pp. 97–115, 2001; Y.-I. Tian, T. Kanade, and J. F. Cohn

The Facial Action Coding System (FACS) was developed by Ekman and Friesen [14] to represent external appearances by activity units (AUs). Thirty of the forty-four FACS AUs that they defined are physically associated with the withdrawals of certain facial muscles: eighteen of them are for the lower face and twelve for the upper face. AUs may occur alone or in combination. When AUs occur in a blend, they may be either an added substance, where the mix does not alter the component AUs' existence, or a no additive, where the constituents' presence does alter. Even though there are just a few nuclear activity units, more than 7,000 different AU mixtures have been seen [30]. The illuminating power required to depict the nuances of outer appearance is provided by FACS. Typically occurring AUs, some of the additional material, and no additive AU mixes are shown in Tables 1 and 2. When there is no additive effect, for example, AU 4 manifests differently depending on whether it occurs alone or in combination with AU 1 (as in AU 1 ‡ 4). The foreheads are lowered down and drawn together at the point when AU 4 occurs on its own. The action of AU 1 has caused the foreheads in AU 1–4 to be lifted, but they are still pulled together. Another example of no additive blends is AU 1–2. When AU 2 occurs on its own, it increases the external forehead while also consistently raising the interior temple, giving AU 1 and 2 essentially the same look. The difficulties in recognizing AUs are exacerbated by these effects of the no additive AU mixes. "Near-field communication sensors and cloud based smart restaurant management system," in Proceedings of the 2016 IEEattern Recognition (CVPRE 3rd World Forum on Internet of Things(WT-IOT), pp. 686–691, 2016, Hussain Saeed, Ali Shouman, Malis Elfar, Mostafa Shabka, Shikharesh Majumdar, and Chung Horng-Lung.

The level of technology has grown in recent years. Thus, this serves as a tool to further the preceding items. As a result, we are using technology for the restaurant grading system. The talk of the town is the increasing popularity of unmanned eateries. There is no direct interaction with guests to get feedback on the restaurant due to worker absences. This research describes an automated restaurant rating system that uses a convolutional neural network (CNN) to identify facial emotions. It comprises of a web server, a CNN that has been trained, and facial expression recognition.

3. SYSTEM ANALYSIS

System Architecture:



Existing System

It is difficult for restaurant management to gauge how patrons will react to the idea and the cuisine when there is no personnel on hand at unmanned restaurants. Current rating services, like Google and Trip Advisor, only address a portion of the consumer base's thoughts, therefore they only partly address this issue. Only a portion of the patrons who independently assess the restaurant on independent review sites utilize these rating methods. This mostly pertains to clients that have either a highly pleasant or unfavorable experience throughout their visit.

Proposed System

To resolve the aforementioned issue, every client has to be encouraged to provide a rating. In order to maximize the amount of ratings, this article presents a method for a restaurant rating system that asks each patron for a review following their visit. This technology, which uses pre-trained convolution neural network (CNN) models for face emotion recognition, may be employed in unmanned restaurants. By photographing or capturing a picture of his face that represents the relevant sentiments, the client may evaluate the dish. There is far less data and no collection of individual experience reports than with a text-based rating system. Nonetheless, a greater variety of viewpoints about patrons' experiences with the restaurant idea need to be provided via this simple, quick, and lighthearted grading method.

4. MODULES

USER:

1) Create a Deep Learning Model for Handwritten Digit Recognition: Using this model, we are constructing a CNN-based handwritten model that predicts the name of a digit by analyzing its picture. A CNN model may be created by using two different kinds of images: test (which are used to assess the train model's prediction accuracy) and train (which include all conceivable forms of digits that a person can write in all possible ways). CNN will create the training model using all of the train photos. In order to construct a model, we will first extract characteristics from train photos. In order to categorize the test picture, we will additionally collect its characteristics during testing and apply the train model to it.

2) Create Text & Image Based Sentiment Detection Deep Learning Model: This module will create a sentiment detection model based on text and images. The text-based sentiment model will be generated using every conceivable term, both positive and negative. The generation of an image-based sentiment model will make use of all varieties of facial expression photos. Every time we enter a word or picture, a train model is applied to it in order to anticipate the feelings contained inside.

3) input Test Picture & Identify Digit: This module will allow us to input a text picture and use a train model to identify a digit.

4) Write Your Thoughts About Government Policies: This module allows us to gather user opinions, which are subsequently saved within the program in order to identify sentiment.

5) View People's Sentiments From Opinions: This module allows the user to view the opinions and sentiments of all people that have been identified by the CNN model.

6) submit Your Face Expression Photo About Government Policies: This module allows the user to submit a picture of themselves along with a face expression that expresses whether or not they are satisfied with the plan.

Determine Sentiment From Face Expression Photo: This module allows many users to see the recognized sentiment and facial expression photo that previous users have submitted.

5. SCREEN SHOTS

Home Page

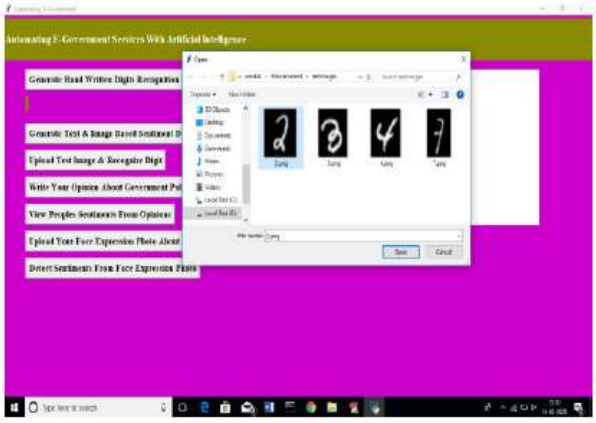
To create a CNN digits recognition model, choose the "Generate Hand Written Digits Recognition Deep Learning Model" button on the above screen.

The screen above shows the CNN layer details and model-generated numbers. A blank console is visible.

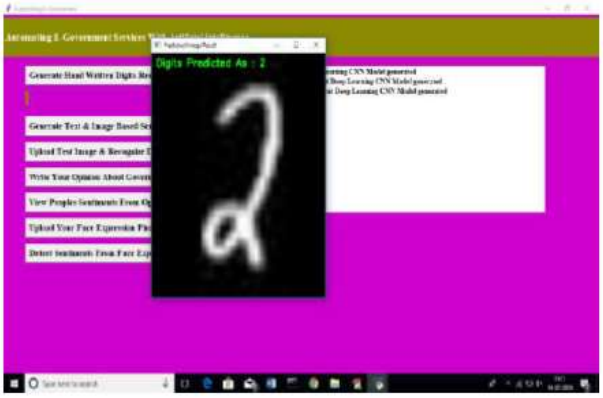
The screen above illustrates how CNN or convolution produces picture features layers with varying sizes. The first layer produces images with sizes of 26 and 26, the second layer produces images with sizes of 13 and 13, and so on. To construct a CNN for a text and picture based sentiment detection model, click the "Generate Text & Image Based Sentiment Detection Deep Learning Model" button.

The above screen displays the created text and image-based CNN model. See blank screen for more information.

To submit digit photographs and get the name of that digit, click the "Upload Test Image & Recognize Digit" button. Every digital picture is stored in the test Images folder.

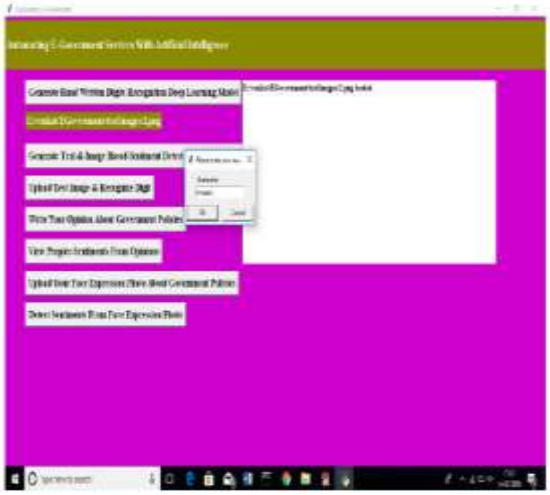


I'm uploading a picture with digit 2 on the screen above, and the result of the detection is shown below.

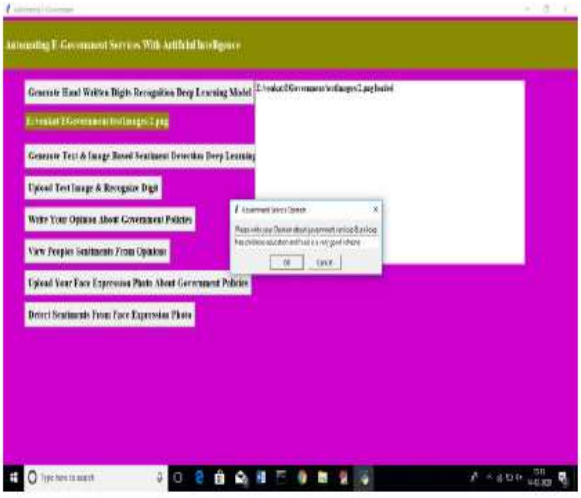


The Digits Predicted panel above displays the following:

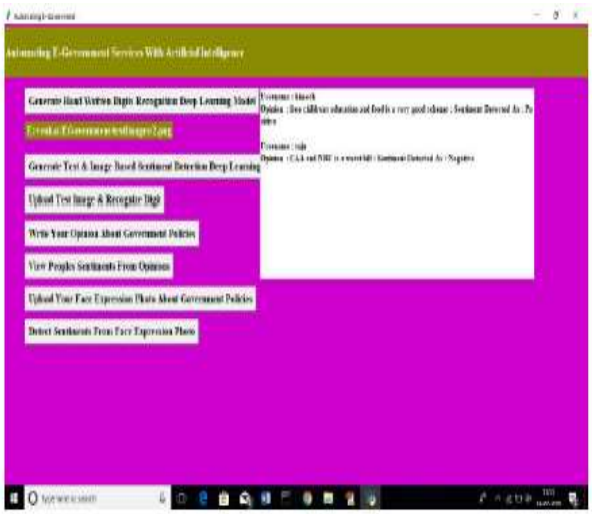
2. To add a remark on government policies, click the "Write Your Opinion About Government Policies" button.



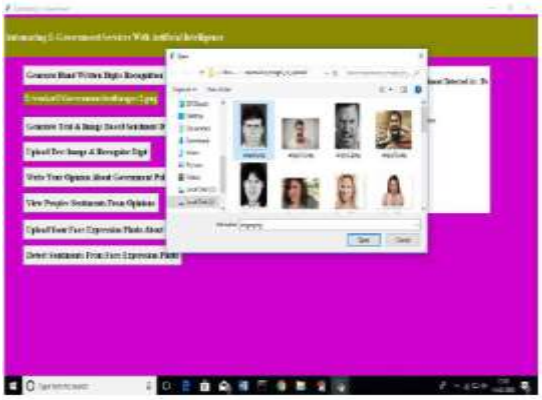
Before submitting our thoughts, we must enter our username on the above box. Once we have done so, click the "OK" button to see the screen below.



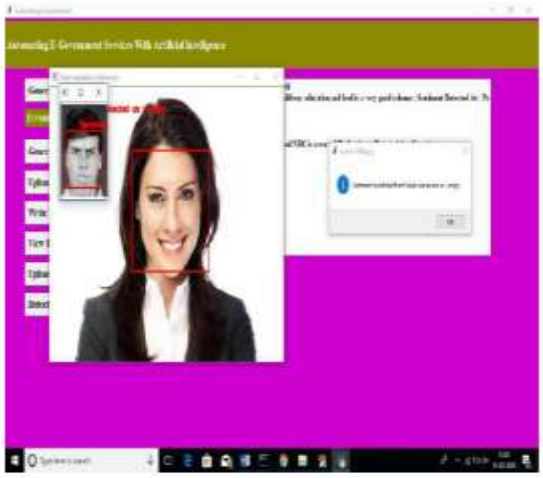
I left some comments on the scheme on the screen above, and the program was able to determine if they were favorable or negative. To see all of the previous users' views, click the "View Peoples Sentiments From Opinions" button.



All user opinions are shown in the text space above the screen. For the first opinion, the sentiment identified was positive, indicating that the user is satisfied with the scheme; for the second opinion, the emotion discovered was negative, indicating that the user is not pleased. Likewise, users have the option to share photos of themselves with facial expressions that convey their happiness or anger.



As I submit a picture of an angry face, the program prompts me to provide my login and the name of the scheme I'm referring to. In a similar vein, anybody may post an unlimited amount of photos. To get all of the photographs and the feelings that have been recognized, click the "Detect Sentiments From Face Expression Photo" button.



As you can see, every picture on the screen above has a face expression associated with it. We may also see the sentiment result in the dialog box. Similarly, you may use as many comments or face photos as you want to identify their emotions.

Conclusion

More government organizations are beginning to embrace AI and deep learning technology to enhance their systems and services as a result of recent advancements in these fields. Adoption of these technologies is, however, hampered by a number of issues, such as trust, processing capacity, expertise, and AI interpretability. We defined artificial intelligence and e-government, spoke about the global e-government indices as of right now, and then we offered our suggestions on how to make the existing status of e-government better while using the Gulf Countries as a case study. We put out a methodology for managing government information resources that aids in the comprehensive management of the e-government lifecycle. Next, we suggested a collection of deep learning methods that may aid in the automation and facilitation of a number of e-government services. Next, we suggested a clever platform for e-government AI development and application. The main objective of this article is to enhance the general confidence, transparency, and efficiency of e-government by introducing new frameworks and platforms to incorporate current breakthroughs in AI methods in the e-government systems and services.

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