

E-Learning and Student Motivation

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Abstract:

Our aim is to develop an efficient, “E-Learning” System in which we will detect user presence by using [1] OpenCV this will make sure that the user to complete the course has to be physically present, the moment our System detects that the user is not present the video will automatically be paused. To help the system admin analyze user activity we our plotting a graph with the help of Bokeh plot which shows when the user was present, and when the user was absent. To understand better the user behavior for the course, we have also implemented an Emotion detection system that will take the frames captured in the motion detection as input and will identify the emotion of the user such as happy or sad. This will give us the precise idea about the quality of the content of the course. This is a self-learning bot developed to take course feedback, user opinions and reviews of user to improve course contents and make the course more effective and interesting to learn for the users. Basically the Chatbot is included in the E-learning System for feedback purposes. [2]Feedback is an important component of interaction. The educational contents in the course is continually improved using the information between the interaction of the bot and the user. These results in a more effective way of course development.

Keywords — *Motion Detection, Chatbot, E-Learning, CNN, Smart CED, Student Motivation, Data Virtualization.*

I. INTRODUCTION

The aim is to develop a “E-Learning and Student motivation System” is to ensure that students actually learn something from the course as most of the people nowadays enrol for the course with the intention to get the certificate but not learn new concepts that the course imparts. To make sure that the students completely watch the course videos we check presence of the user by using motiondetection.

To detect the user presence, motion detection is performed used OpenCV. OpenCV is an open source computer vision library that provides the programmer with various tools that would help to perform various operations on the images captured.

To visualize the data collected using motion detection we are using a python library called as bokeh plot. This python library will help us to create a interactive graph which will be saved as html file. Data visualization is included in this application to help the course admin analyze student presence as the graph gives a detailed look of the

time when the student was present and when the student was not present.

To implement Emotion Detection we are using CNN (Convolutional Neural Network). It is a type of neural network used for image processing. Emotion detection will help us to analyze user response for the course and accordingly take necessary action for the betterment of the course.

A chatbot is a piece of code which is designed in such a way that it replicates human conversation. This chatbot is made with the help of python library called flask which is used to manage web applications in python.

II. LITERATURE SURVEY

A. Use of MotionDetection:

First, [3]Motion Detection For Security purposes – Motion Detection can be used in CCTV Surveillance System which uses Raspberry pi as a camera module to capture images. This System will not only record the activities using motion

but also recognize the face to eliminate the error caused due to motion detection.

Motion Detection used to Control the cursor using hand gestures – This system proposes a solution which helps to control your device's cursor using gestures [4].

Motion detection used to recognize the pose of a certain object and for measuring the motion produced by a certain video scene [5].

Vehicle Classification and Traffic analysis – This System uses motion detection to classify vehicles in three different categories such as cars, trucks, bikes [6]. It helps the government for counting no of vehicles which can be used in traffic analysis. This system can also count vehicles from pre-recorded videos.

Smart CED (Contactless Epilepsy Detector) - This application implements a wire-less cheap epilepsy diagnostic system. This system does most of the processing directly through your phone [7].

B. Use of Chatbot in aBusiness:

Convolutional Neural Network for speech emotion detection - This model is trained from raw audio data set and is classified into three classes angry, happy, and sad [8].

Real Time Convolutional neural network for emotion and gender detection - This CNN model accomplishes the aim of detecting gender and emotion classification simultaneously [9]. It uses the IMDB gender and FER-2013 datasets.

Video-based emotion detection – This System combines recurrent neural network (RNN) and 3D Convolutional networks (C3D). RNN and C3D encode appearance and information regarding motion in various ways. RNN accepts the appearance features extracted by CNN as input and then encodes the motion [10].

Deep Convolutional Neural Network for Facial Expression Recognition using Facial parts – The

facial parts (FP's) are given as input to the first convolutional layer [11]. The extracted feature for ex eyes are given as input to the first channel and the mouth for ex is given input to the second channel. To learn global information from these local features, information from both the channels are mingled in the fully connected layer. This is then used for classification.

C. Use of Chatbot in aBusiness:

To Automate most commonly asked questions – The bot can be trained on the questions which are frequently asked by the customers. This saves the valuable time of the Employees which otherwise would have been wasted in asking and answering repeated questions [12].

Saves the valuable time and effort of the organization's support staff – This automated bot acts as a middleware between the End user and the Organization's Support staff. The bot answers the frequently asked questions by itself and intelligently handles the customer, bot transfers the control to the support staffs only when the situation needs human intervention.

Improves Aftersales service and customer experience – In today's competitive market to retain customers providing good customer support is very important. Chat bots helps the organization to provide reliable and quick customer support 24 by 7. It is always easy to retain customers than to gain new ones.

Chatbots are Affordable – As compared to the cost of hiring a person for providing customer-support, the development cost of chat bot is far less. This helps to reduce the overheads of business

Takes the User Interaction to next level – The chat bots learn from past conversations. Over time the chat bots become more smart and intelligent and hence they are able to conduct smooth and hassle-free user Interaction

D. Use of Chatbot in an E-Learning Industry:

Chatbot helps the teachers to give personal attention to each student – The implementation of chatbots provides an interactive and personalized experience to students. It helps to keep a constant track of the academic progress of the students and encourages students to perform well by giving regular reminders and notifications [13].

Chatbots are more versatile – The grasping skills of each student is different so each student requires a specific way of teaching. The most important advantage of being educated by a chatbot is that it gradually adapts to the speed of understanding of a particular student and accordingly varies its speed of teaching. In this we can make our education system more Effective and personalized.

Assists the teachers in routine tasks – Chatbots act as a helping hand to teachers by assisting the teachers in checking assignments, tests and hence enables the teachers to give more of their valuable time in attending students on one-to-one basis

III. PROPOSED SYSTEM

A. Overall Flow of E-Learning System

- User/admin authentication will be done (There will be two Log in's user and admin)
- Admin will be able to make changes to the course content and the monitor user presence using the graph.
- Once the user starts watching the video its presence will be monitored by capturing the video frames.
- With the help of the information captured we plot a graph which shows the time the user was present and the time the user was not present
- This captured video frames will be given as input to the Emotion detection module which will detect the mood of the user.
- After the completion of the course the chatbot will collect feedback by having a meaningful conversation with the user.

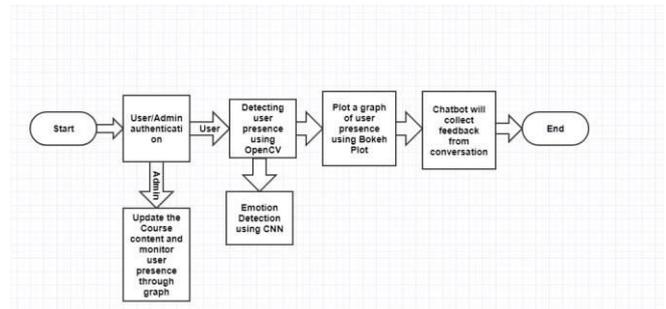


Fig. 1: Flow of E-Learning System

B. Algorithm for Motion Detection

- Assign the first_frame , status_list, times =none
- Store the columns start and end time in the data frame 'df'.
- Use the video_Capture() to start the camera to capture the image
- Use while loop to read images.
- Then convert the images from 3 channels to 1 channel grey scale image
- If the first_frame is none then convert it into grey
- Then find the Absolute Difference
- Then using contour_Area() draw the rectangular frame
- Append the date_time to the status list
- All this frames captured will be stored in Times.csv file.

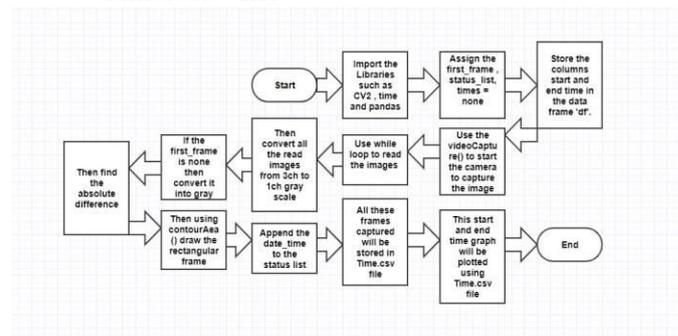


Fig. 2: Flow of Motion Detection Algorithm

C. Algorithm for Data Virtualization (BokehPlot)

- Plot the values on the graph.
- Set height width and title of the graph.
- Set the color of the graph and the data for which the plotting has to be done.
- Store the graph output in the html file

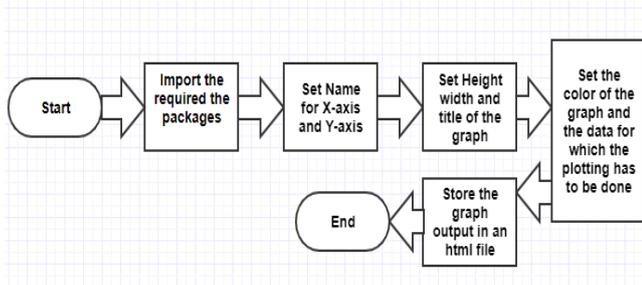


Fig. 3: Flow of Bokeh Plot Algorithm

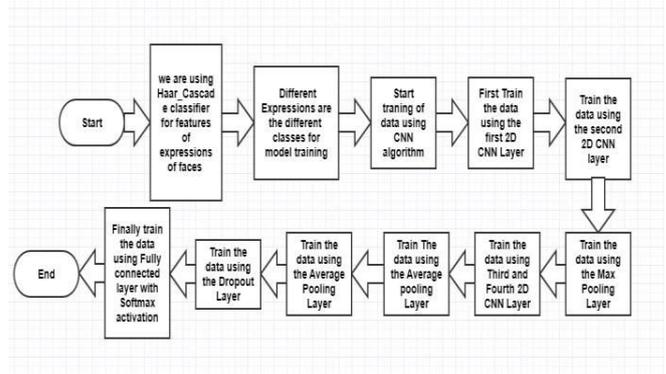


Fig. 4: Flow of Emotion Detection Algorithm

D. Algorithm for EmotionDetection

Using Harr_Cascade Classifier we extract the features of expressions of faces. Different Expressions are the different classes for model training.

- First 2D CNN layer: defining a single filter would only allow the neural network to learn only one single feature, this is not sufficient therefore N number of filters are defined. The output of this is the neuron matrix form.
- Second 2D CNN layer: The output of the first CNN is given as input to the second CNN layer. Again train the number of filters as in the first CNN layer.
- Max pooling layer: It reduces the output complexity and, it prevents overfitting of data.
- Third and fourth 2D CNN layer: This layers of CNN helps to learn high level features. The output after the two consecutive CNN layers is $2 * 160$.
- Average pooling layer: It also avoids overfitting of data. Instead of taking the maximum value in this layer, we take the average value of two weights within the neural network
- Dropout layer: This layer assigns '0' weights to the neurons. The number of neurons getting zero weights usually depends on the chosen rate. This layer increases the Accuracy on unknown data.
- Fully connected layer with Softmax activation: This reduction in height is done by Matrix multiplication. Softmax is used as an activation function. Forces the N outputs of the neural network to sum to one.

E. Algorithm for ChatbotCreation

- First create a UI for the chatbot with the assistance of HTML and for giving appropriate color and font to the chatbot page use CSS.
- Then train the chatbot using a .csv file which contains a set of basic questions which the chatbot will need while having a conversation with the user. This .csv file acts as a brain of the chatbot.
- Maintain another .csv file to store the recent conversation, which can be used to retrain the bot.
- Use the python flask library to handle the functionality of the web bot. Import the chatterbot library which will help to generate responses to user questions.
- By using render_template() display the chatbot HTML page on the particular URL.
- By using @application.route("/get") fetch the user question and print the appropriate bot response on the webpage.

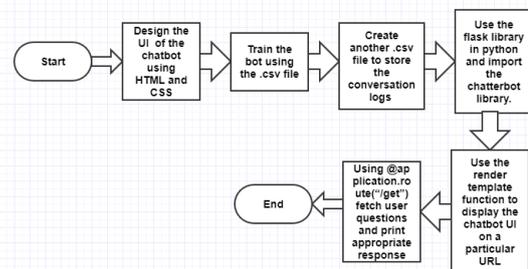


Fig. 5: Flow of Chatbot Creation

F. Algorithm for Training the Bot

- Open the .yml file to write the newdata.
- Open the chatbot.csv file to import the new data to the .yml file
- If any error occurs while importing the new rows print the respective error msg on the command prompt otherwise print that all the rows are successfully imported.
- Then clear the old training file using the os.remove() method.

Gliffy / *untitled

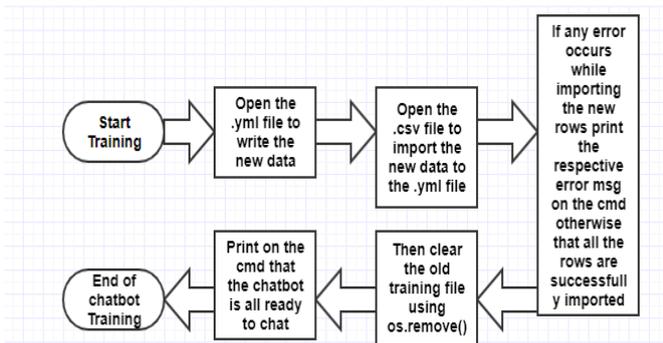


Fig. 6: Flow of Chatbot Training Algorithm

G. Algorithms to Train a Bot on ConversationLogs

- Open the BotLog.csv which contains the recent conversation.
- Create a reader 'g' and assign it to the Linesvariable.
- Create two variables and assign userText = Line [0] and BotReply = Line[1].
- Store the new response of the bot in the updateResponsevariable.
- Then write this Updated response in the chatbot.csv file.
- Then import the updated response in the .ymlfile.

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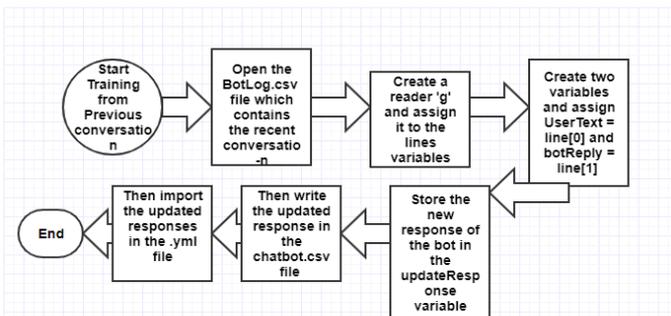


Fig. 7: Flow of Bot Training on Conversation Log

IV. IMPLEMENTATIONS

A. MotionDetection

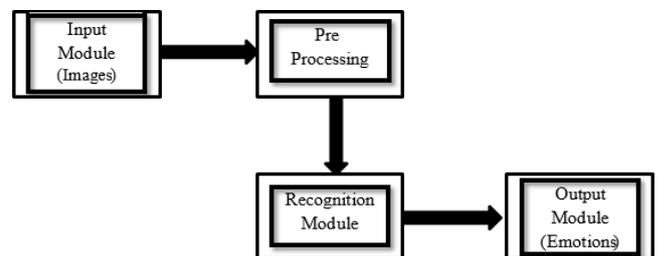
- i. Face detection [14]:
 - Phase 1: Gather data (faceimages)
 - Phase 2: Train therecognizer
 - Phase 3: face recognition/motiondetection
- ii. Methodologies involved in motiondetection:
 - Saving the initial frame[15]
 - Pixellate filter: Convert the image to a Gaussian blurimage
 - Compare the Gaussian blur image of the previous and current imageframe
 - Calculate the difference between the two images to identify the change inmotion
 - Define the threshold to removeshadows
 - Calculate the time, the object appears and exits a frame
 - Use of graph to plot thetime

B. Graphs using BokehPlots

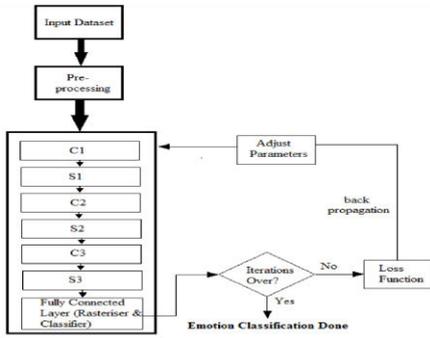
- The white portion in the graph indicates that the user was notpresent.
- The Green portion indicates that the user waspresent.

C. Emotion Detection usingCNN

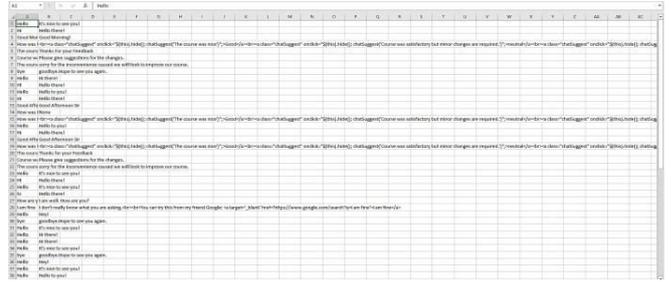
i. Methodology-



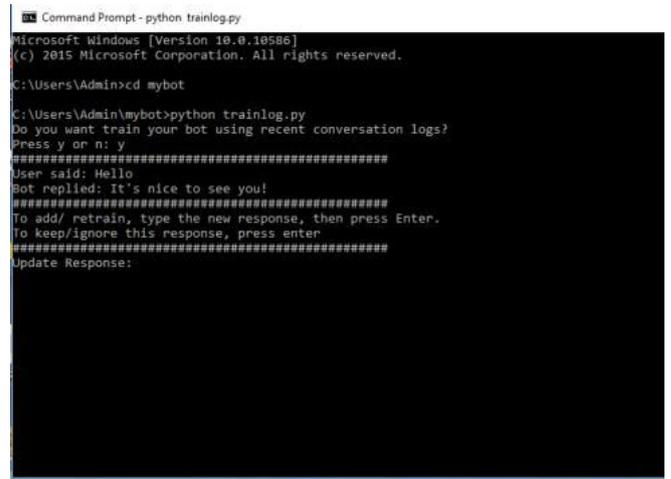
ii. DataProcessing-



3. BotLog.csv file to store recentconversation-

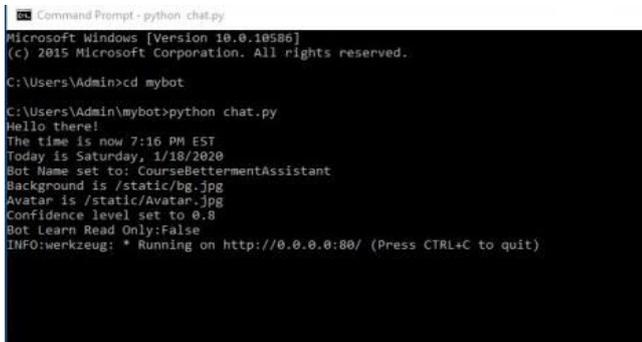


4. To train a bot using recentconversations-



D. Chatbot

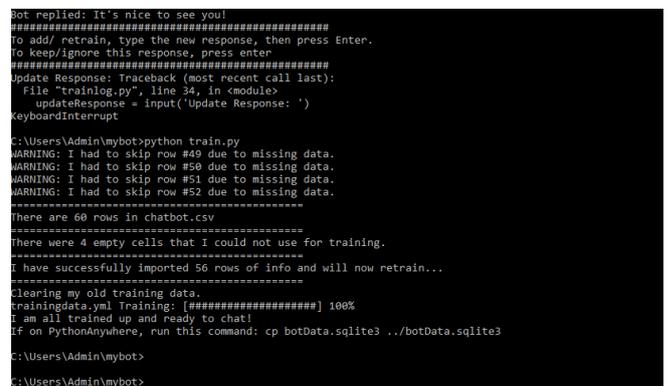
1. To start the chatserver-



2. Chatbot Interface-



5. To train thebot-



V. CONCLUSION

We created this system for better performance and motivation of the students who are involved in E-Learning. This system analyzes the presence of the user through a graph and ensures the student is present throughout the course. For

continual improvement of the course contents, we have designed a chatbot whose conversation information is used to make the course more effective and interesting to learn. The aim of keeping the course more interactive is achieved through this, thus making the process of learning fun and productive.

REFERENCES

1. OpenCV open source computer visionlibrary.in
2. jeuring_04_ontologybasedfeedback - Harrie Passier and JohanJeuring
3. Smart Surveillance System using Raspberry pi and Facial Recognition - Chinmaya Kaundanya1, Omkar Pathak, Akash Nalawade, SanketParode
4. Real Hand Motion Detection System - Ibrahim Furkan Ince, Manuel Socarras-Garzon, Tae-Cheon Yang
5. Motion Segmentation and pose recognition – Gary.R. Bradski , James. W. Davis
6. Moving Vehicle Detection for measuring traffic count using OpenCV – Nilesh. J. Uke,Ravindra.C.Thool
7. SmartCED – Luca Cattani, RiccardoRaheli
8. A first Look into a Convolutional neural network for speech emotion detection – Dario Bertero, Pascale Fung
9. Real Time Convolutional neural network for emotion and gender detection – Octavio Arriaga, MatliasValdenegro
10. Video-based emotion recognition using RNN, CNN and C3D hybrid networks – Yin Fan, Dianli
11. Deep Convolutional Neural Network for Facial Expression Recognition using Facial parts – Lucy Nwosu, HuiWang
12. <https://chatbotsjournal.com/top-10-reasons-why-your-business-need-a-chatbot-development-5a53760da1b6>
13. <https://elearningindustry.com/chatbots-for-elearning-4-ways-using>
14. Facial Recognition using OpenCV. Shervin Emami, valentinpetrut.
15. Introduction to Computer Vision using OpenCV – Berkley Design Technology,Inc