Capstone Project Submission

**Instructions:**

1. Please ﬁll in all the required information.
2. Avoid grammatical errors.

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| **Team Member’s Name, Email and Contribution:** |
| Yogesh. K, [Yogeshiaf399@gmail.com](mailto:Yogeshiaf399@gmail.com) Individual Project. |
| **Please paste the GitHub Repo link.** |
| Github Link:- https://github.com/Yogeshkrishn/Face-Emotion-Recognition.git |
| **Please write a short summary of your Capstone project and its components. Describe the problem statement, your approaches and your conclusions. (200-400 words)** |
| **PROBLEM STATEMENT**  The Indian education landscape has been undergoing rapid changes for the past 10 years owing to the advancement of web-based learning services, specifically, eLearning platforms. Global E-learning is estimated to witness an 8X over the next 5 years to reach USD 2B in 2021. India is expected to grow with a CAGR of 44% crossing the 10M users mark in 2021. Although the market is growing on a rapid scale, there are major challenges associated with digital learning when compared with brick and mortar classrooms. One of many challenges is how to ensure quality learning for students. Digital platforms might overpower physical classrooms in terms of content quality but when it comes to understanding whether students are able to grasp the content in a live class scenario is yet an open-end challenge. In a physical classroom during a lecturing teacher can see the faces and assess the emotion of the class and tune their lecture accordingly, whether he is going fast or slow. He can identify students who need special attention. Digital classrooms are conducted via video telephony software program (ex- Zoom) where it’s not possible for medium scale class (25-50) to see all students and access the mood. Because of this drawback, students are not focusing on content due to a lack of surveillance. While digital platforms have limitations in terms of physical surveillance but it comes with the power of data and machines which can work for you. It provides data in the form of video, audio, and texts which can be analyzed using deep learning algorithms. Deep learning backed system not only solves the surveillance issue, but it also removes the human bias from the system, and all information is no longer in the teacher’s brain rather translated in numbers that can be analyzed and tracked. We will solve the above-mentioned challenge by applying deep learning algorithms to live video data.The solution to this problem is by recognizing facial emotions.  **SUMMARY**   * One of the biggest problems of E-learning systems is to maintain the motivation of the students in the virtual classrooms. This situation is easier in formal classrooms because the educator is in face-to-face contact with the students in the same environment. In this aspect, it is much easier to observe their emotional states and motivations.      * The purpose of the project is to develop a Facial Emotion Recognition System (FERS), which recognize the emotional states of students in video- conference type E-learning systems. In order to create a more interactive educational environment, this system transfers the emotional states of the students to the educator instantaneously. Our study is supportive of the studies that make possible to observe the motivation level of both the individual and the virtual classroom in the e-learning systems. * The data comes from the past Kaggle competition “Challenges in Representation Learning: Facial Expression Recognition Challenge”: we have defined the image size to 48 so each image will be reduced to a size of 48x48.The faces have been automatically registered so that the face is more or less centered and occupies about the same amount of space in each image. Each image corresponds to a facial expression in one of seven categories (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, 6=Neutral). The dataset contains approximately 36K images. Dataset link - <https://www.kaggle.com/msambare/fer2013>.   **APPROACHES INVOLVED**   * **Building Model : CNN layers**   **Parameters**   * Activation Function - ReLu, Softmax * Epoch - 40 * Optimizer - Adam * Batch size -32   **Also we use some common techniques for each layer**   * Batch normalization * Dropout * **Model Evaluation** * **Creating Web App Using Streamlit** * **Creating Web App Using Heroku**   **CONCLUSION**   * Our model is giving an accuracy of 81% and is robust in that it works well even in a dim light environment. * The application is able to detect face location and predict the right expression while checking it on a local webcam. * The front-end of the model was made using streamlit for webapp and running well on local webapp link. * Finally, we successfully deployed the Streamlit WebApp on Heroku and Streamlit share that runs on a web server. * And we believe that through this model teachers can understand the students' perception during online classes and change the way of teaching if needed by understanding the students’ motive. |

**Thank You**