ODIS – Orderly Demeanor Inspection System

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A B S T R A C T

In the current world, time is considered an immense treasure. People never want to waste the time and schedule their day with prioritized works. The thing people fail to understand is trying to balance the time they forget to balance their mental states. For a healthy run of the body, we not only require a healthy exterior but also a fruitful interior. When our mind runs smoothly then the body reflects the same. Failing to understand this concept the people ignore their mental balance, resulting in effects such as stress, sensation to commit extreme measures, etc. This type of behavior is always dangerous to them and also to the society around them. To contain this type of sociopathic behavior, psychologists and other professionals were trying to develop a system which detects such type of behaviors. But in this paper, we propose a system that intends to cut the problem in its roots than identifying it later. The system proposed is a semi-robotic interface that interacts with the user in toil and solves their cause of distress and maintains a mental equilibrium of that particular user. The introduction of this system brings a drastic change in the society which always struggles to maintain peace and equilibrium with itself.

1. Introduction

As we discussed in the earlier sequences, the world we live in requires societies that withhold mental equilibriums rather than a group of sociopaths. The reason we tend to move towards the contradiction of a proper society is the lack of human interactions and spending time with people. Due to this, humans tend to diverge towards a path where they will be taking extreme decisions and develop hatred towards the surroundings rather than being part of it. We introduce a method where a person can feel free to interact with the proposed system to reduce the tensions and stress building around in absence of people around. These types of serious conditions can be viewed in scenarios like children who have working parents or lost them tragically, people trying to maintain work-life balance, etc. These people can just express their feelings with the system till they feel relieved and back to a happy life.

We try to design the system in a way that infiltrates the user's feelings by capturing his facial expressions and analyzing his condition. This helps the person itself as he might hesitate to initiate during some intimate scenarios, where our system steps forward to initiate the conversation. The major addition we try to provide is a two-way conversation. We may not express in the assurance that the answer from the system in a two-way conversation can be utilized as an idea in real life but can be said surely that it will lift the morale of the person in depression. Another major additional feature we are trying to embed is the self-learning capability of the system as per the user’s previous experiences and his way of interest in the length of conversations. In a short form, the previous feature stated can be expressed as “customization”, which means adapting as per the users' requirement and change in behavior through reaction to the conversation. For designing such products we require the support of technologies like machine learning, image processing, etc., which can act like humans in the absence of real people. The reason we choose these technologies is that we want to enforce a type of environment where a person with senses needs aid and any wrong move can cause damage to his life, so we tend to be careful and conscious in designing with a good efficiency rate to prove the safety in using such products. The cluster clear explanations regarding individual modules, working, and integrations into a single system are stated in the following sections. To support those proposals we also like to add the topic of confidence on the output provided by the system and the consequences created. We need to first channelize our mind that how efficient a device maybe but it has its restrictions in understanding few feelings which a person understands in a facile manner. These are the ones that differentiate and draw a line between humans and other organisms (also the electronic devices). Here we try to render a device which tries to eliminate evil thoughts arose in the minds of the user during certain emotional phase through making the user flush out the feelings hidden and making him suffer.

We ensure the effectiveness of the device we design remains loyal to the user and maintains the confidentiality of particular data and also avoids being a replacement for a human. The range of features it possesses can impact the life of the user in many ways. We try to input as many conversational inputs as we can to make the user feel better before acting anything in the state of urgency. This particular product is suitable for all sorts of age groups and also no gender restrictions.

The arguments from the people around being the similarity of this to a voice assistant and face capturing can be countered by stating its real-time usage and the amount benefits it provides and situations it fixates can be enough to sidetrack those comments. The existing ideologies and the variant our product provides and as well as the range of advantages our product holds with the technologies utilized are explained as follows.

1. Literature Survey

**Survey 1: EEG-Based Emotion Recognition Using Regularized Graph Neural Networks,** [**Peixiang Zhong**](https://arxiv.org/search/cs?searchtype=author&query=Zhong%2C+P)**,**[**Di Wang**](https://arxiv.org/search/cs?searchtype=author&query=Wang%2C+D)**,**[**Chunyan Miao**](https://arxiv.org/search/cs?searchtype=author&query=Miao%2C+C)

[Peixiang Zhong](about:blank), [Di Wang](about:blank), Chunyan Miao examined that the Electroencephalography (EEG) measures the neuronal activities in different brain regions via electrodes. Many existing studies on EEG-based emotion recognition do not fully exploit the topology of EEG channels. In this paper, we propose a regularized graph neural network (RGNN) for EEG-based emotion recognition. RGNN considers the biological topology among different brain regions to capture both local and global relations among different EEG channels. Specifically, we model the inter-channel relations in EEG signals via an adjacency matrix in a graph neural network where the connection and sparseness of the adjacency matrix are inspired by neuroscience theories of human brain organization. In addition, we propose two regularizes, namely node-wise domain adversarial training (NodeDAT) and emotion-aware distribution learning (EmotionDL), to better handle cross-subject EEG variations and noisy labels, respectively. Extensive experiments on two public datasets, SEED and SEED-IV, demonstrate the superior performance of our model than state-of-the-art models in most experimental settings. Moreover, ablation studies show that the proposed adjacency matrix and two regularizes contribute consistent and significant gain to the performance of our RGNN model. Finally, investigations on the neuronal activities reveal important brain regions and inter-channel relations for EEG-based emotion recognition.

# Survey 2: Factors Affecting the Impact of Emotional Intelligence on Workplace Behavior: A Study of Bank Employees [Simarjeet Makkar](https://journals.sagepub.com/doi/abs/10.1177/0972150917713903?journalCode=gbra), [Sriparna Basu](https://journals.sagepub.com/doi/abs/10.1177/0972150917713903?journalCode=gbra)

# [SimarjeetMakkar](about:blank), SriparnaBasu examined that the impact of emotional intelligence (EI) on the workplace behavior of the employees in the Indian banking sector. Banking industry was chosen for this research owing to the dynamic nature of this sector propelling a heightened need for compatibility and resilience of employees. The purpose of the study was twofold: (a) to examine if there is a significant impact of EI on workplace behavior of the employees in both private and public sector banks; and (b) to determine if the impact is more in one sector than the other. Goldman’s EI framework (1995) and Emotional Competence Inventory (ECI) was used for data collection. Six banks were selected for this study: three from the public sector and three from the private sector as sample covering Mumbai. The findings of the study revealed that there is a strong relationship between EI and workplace behavior of employees in the banking sector and there is also a difference of the impact of EI on workplace behavior of the employees in private and public sector banks. The analysis derives meaningful implications for managerial policy in banks as well as for future research. This review, I discuss how we measure inaccuracy, the source of errors in self- monitoring of blood glucose (SMBG), clinical testing of the systems, and how some of these errors can be minimized or eliminated.

# Survey 3: A study on emotion recognition method and its application using face image [Hyeon-Jung Lee](https://ieeexplore.ieee.org/author/37086307381); [Kwang-Seok Hong](https://ieeexplore.ieee.org/author/37534731400)

# [Hyeon-Jung Lee](about:blank); [Kwang-Seok Hong](about:blank) examined that to introduce seven emotions and positive and negative emotion recognition methods using facial images and the development of apps based on the method. In previous researches, they used the deep-learning technology to generate models with emotion-based facial expressions to recognized emotions. There are existing apps that express six emotions, but not seven emotions and positive and negatives in graphs and percentages. Thus, we recognized seven emotions such as Angry, Disgust, Fear, Happy, Sad, Surprise, and Neutral and also classified the calculated emotion-recognition scores into positive, negative and neutral emotions. Then we implemented an app that provides the user with seven emotions scored and positive and negative emotions.

# Survey 4: Speech Based Voice Recognition System for Natural Language Processing, Kavitha Raju

# Kavitha Raju examined that a system that recognizes and authenticates the voice of a user by extracting the distinct features of their voice samples is usually termed as Voice recognition system. Voice identification is carried out by converting the human voice into digital data. The digitized audio samples then undergo feature excerption process to extract Mel Frequency Cepstral Coefficients features. These coefficients are subjected to feature matching through Dynamic Time Warping to match with the patterns existing in the database for limited Tamil words. This paper focuses on a secure system that deploys the voice recognition for a natural language (Tamil) by combining the digital and mathematical knowledge using MFCC and DTW to extract and match the features to improve the accuracy for better performance.

# Survey 5: Deep Audio-Visual Speech Recognition, TriantafyllosAfouras, Joon Son Chung, Andrew Senior, Oriol Vinyals, Andrew Zisserman

# TriantafyllosAfouras, Joon Son Chung, Andrew Senior, Oriol Vinyals, Andrew Zisserman examined that the goal of this work is to recognize phrases and sentences being spoken by a talking face, with or without the audio. Unlike previous works that have focused on recognizing a limited number of words or phrases, we tackle lip reading as an open-world problem – unconstrained natural language sentences, and in the wild videos. Our key contributions are: (1) we compare two models for lip reading, one using a CTC loss, and the other using a sequence-to-sequence loss. Both models are built on top of the transformer self-attention architecture; (2) we investigate to what extent lip reading is complementary to audio speech recognition, especially when the audio signal is noisy; (3) we introduce and publicly release a new dataset for audio-visual speech recognition, LRS2-BBC, consisting of thousands of natural sentences from British television. The models that we train surpass the performance of all previous work on a lip reading benchmark dataset by a significant margin

# Survey 6: Audio-visual speech recognition incorporating facial depth information captured by the kinect, Georgios Galatas, Gerasimosotamianos , Fillia Makedon

# Georgios Galatas, Gerasimosotamianos, Fillia Makedon examined that investigate the use of facial depth data of a speaking subject, captured by the Kinect device, as an additional speech informative modality to incorporate to a traditional audiovisual automatic speech recognizer. We present our feature extraction algorithm for both visual and accompanying depth modalities, based on a discrete cosine transform of the mouth region-of-interest data, further transformed by a two-stage linear discriminant analysis projection to incorporate speech dynamics and improve classification. For automatic speech recognition utilizing the three available data streams (audio, visual, and depth), we consider the feature and decision fusion paradigms, the latter via a state-synchronous tri-stream hidden Markov model. We report multi-speaker recognition results on a small-vocabulary task employing our recently collected bilingual audio-visual corpus with depth information, demonstrating improved recognition performance by the addition of the proposed depth stream, across a wide range of audio conditions.

# Survey 7: A Survey of Sentiment Analysis Based on Transfer Learning, Ruijun Liu, Yuqian Shi, Changjiang Ji, and Ming Jia

# Ruijun liu, yuqian shi, changjiang ji , and ming jia examined that the rapid development of the Internet industry, sentiment analysis has grown into one of the popular areas of natural language processing (NLP). Through it, the implicit emotion in the text can be effectively mined, which can help enterprises or organizations to make an effective decision, and the explosive growth of data undoubtedly brings more opportunities and challenges to the sentiment analysis. At the same time, transfer learning has emerged as a new machine learning technique that uses the existing knowledge to solve different domain problems and produces state-of-the-art prediction results. Many scholars apply transfer learning to the field of the sentiment analysis. This survey summarizes the relevant research results of the sentiment analysis in recent years and focuses on the algorithms and applications of transfer learning in the sentiment analysis, and we look forward to the development trend of the sentiment analysis.

### Survey 8: A Study on Emotional Intelligence at Work Place, Desti Kannaiah, R. Shanthi

# Desti Kannaiah, R.Shanthi examined that the Emotional Intelligence (EI) must somehow combine two of the three states of mind cognition and affect, or intelligence and emotion. Emotional intelligence refers to the ability to perceive, control, and evaluate emotions. Some researchers suggest that emotional intelligence can be learned and strengthened, while other claim it is an inborn characteristic. A number of testing instruments have been developed to measure emotional intelligence, although the content and approach of each test varies. If a worker has high emotional intelligence, he or she is more likely to be able to express his or her emotions in a healthy way, and understand the emotions of those he or she works with, thus enhancing work relationships and performance. Emotional Intelligence is not about being soft! It is a different way of being smart - having the skill to use his or her emotions to help them make choices in the moment and have more effective control over themselves and their impact on others. Emotional Intelligence allows us to think more creatively and to use our emotions to solve problems. Emotional Intelligence probably overlaps to some extent with general intelligence. The emotionally intelligent person is skilled in four areas: Identifying emotions, using emotions, understanding emotions, and regulating emotions.

1. Proposed System

The proposed system majorly concentrates on the topic of the emotional balancing of a human. It tries to eliminate the loneliness of the user through interactions at critical and depressing times. Simply stating it acts as a part-time companion for the person in need.

This system interacts with the user in the time of need through image capturing and emotional analysis. Later it tries to consolidate the user and bring to a neutral or pleasant mood.

Advantages:

1. Helps to stabilize the mental health of an individual.
2. Provides emotional support.
3. Customizable

### Requirement analysis and Specification:

The requirement specification and analysis try to identify, analyze and model the functionality or distinguish one’s features. The requirement engineering holds phases namely feasibility study, elicitation, specification, and validation. These stated phases are needed to be managed by requirements management. As the process is followed in a spiral of activities elicitation and analysis of requirements can be performed iteratively. The iterative cycle involves identification of requirements, classification and organization, negotiation, and documentation of requirements. **System architecture** is the structural design of systems. Systems are a class of software that provides foundational services and automation. The system architecture of software provides a detailed view of the functions and workings of a system. The below diagram (figure 1) represents the system architecture of ODIS.

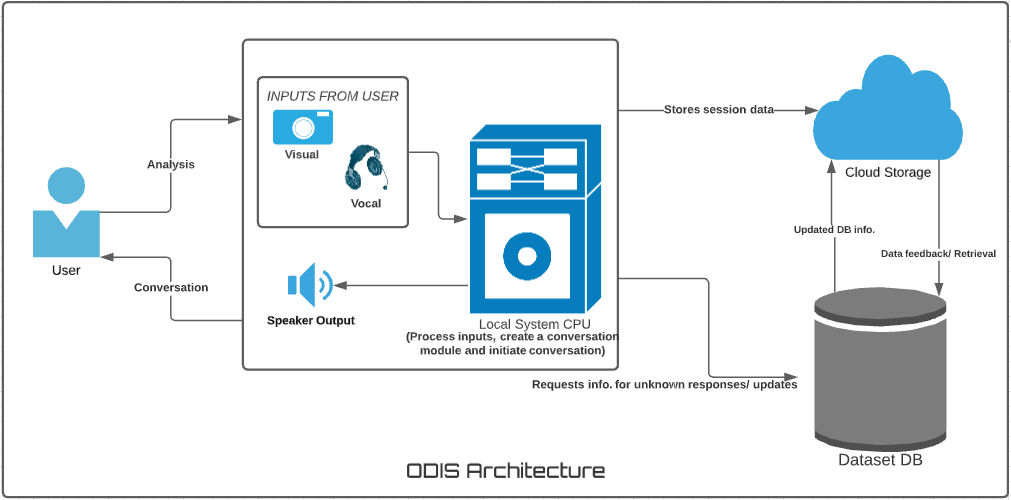
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#### System Module:

The ODIS has three modules where two modules are accountable for I/O and the third module is responsible for processing and executing the complete process.

The three main modules of ODIS are:

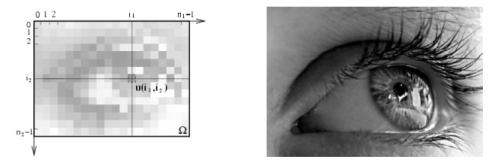
1. Facial Analysis Module
2. Speech Synthesis Module
3. Process Function



***Fig. 3.1: ODIS System Architecture***

***Facial Analysis Module:***

The work of facial analysis module is to capture real-time images of the individual facing the webcam and convert the image obtained into a form of an array using the keras module (Tensor-Flow), the array is analyzed with the trained dataset for emotion prediction. Once the prediction is done the system loads in respective dataset into the speech module to create the conversation, after each response is generated another real-time image is captured to check if there is any change in the emotion of the user.





***Fig. 3.2: An image is seen as a function defined in continuous space***

The process goes on until the emotion is neutral or happy and once the prediction turns out to be either of them, then the entire session is formed as a record for future conversational efficiency and requirements.

**Speech Synthesis Module:**

The speech synthesis module is initiated when a dataset is loaded in, containing information about the emotional state of the individual. Once the dataset is loaded in, the speech synthesis recreates a conversation from the dataset to converse with the user to soothe their emotion to provide them emotional support when they require it, every such conversation and response generated is being recorded locally to train the model to work as a custom unit and this helps the system to work more efficiently, which will aid in providing a better understanding over the user's emotional stability and needs.

#### Processing Module:

The work of the processing module is to retain and collect data from both the user as well as the main database. The Emotion analyzed from the Facial Analysis module is processed and relevant data is looked up for in the local system if no dataset supports the current emotional state of the user then the processing module checks the major dataset DB for all relevant datasets, such datasets are imported and utilized to initiate a conversation. Once the conversation is initiated when an unidentified response is generated by the user the processing units break down the sentence into a set of keywords and searches the main storage DB Cloud for support towards the response obtained if no support is available then the response is pinned to the cloud to generate the response request so that any such similar response request in future can be satisfied for user comfort. When the conversation has led to the desired result the entire request-response and conversation data are stored for a future record which will help the processing unit to get a broader idea over the required conversation response-request chat.

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1. Work Flow

#### Analyze Facial Expression

The facial recognition is initially run to understand the user’s emotional state. The emotional state is analyzed by converting the captured real-time image into an array of matrices and then each array is analyzed with the trained dataset to predict the emotional state.

*Pre-process emotional data*

Initially, before creating a conversation the emotional data obtained is used to choose the relevant datasets that can be utilized to create a meaningful and worth-while conversation for the user. The datasets chosen are consolidated and a conversational module is created.

*Initializing conversation*

As the conversation with the user is initiated, the system checks for any previous records of the user that is relevant to the current emotional state. If no such record exists the consolidated conversation is carried out, else if there is a previous record, the recorded response-request is refactored and run for better results.

*Conversation*

As the conversation with the user is initialized and running if there is a response from the user that cannot be processed or if the system does not have an idea over the response then the response is split into keywords and is searched over the major cloud data storage if there are no results for the response in the cloud then the response is pinned to be updated to the data storage

*End of conversation*

The conversation ends when the result of the emotional recognition turns out to be either happy or neutral, until then the conversation will be carried on. Once the desired emotion is attained then the conversation stops and the entire session is recorded.

*Post-Session Data Handling*

After the end of the conversation, the recorded data is saved as documentation for future purposes when the user has the same emotional state. This helps in utilizing the data to analyze the emotional mindset and initiate a more user-centred conversation.

1. Algorithm

Emotion Recognition:

1. for pixels in frame
2. convert pixels into arrays;
3. While pixel\_array > 0:
4. Compare pixels from data;
5. If pixels do not match data present:
6. Send frame to main server for analyzing;
7. Get response and update current dataset;
8. Set emotion data as current

Conversation:

1. Switch case for current
2. While current != happy || neutral
3. Load respective conv dataset;
4. Current == curr
5. While conv\_itr != 5:
6. Get response of user for question;
7. Analyze response ;
8. Run Emotion Recognition;
9. If current != curr:
10. Break;
11. If current == happy || neutral:
12. Run general dataset;
13. Update records;
14. Exit;
15. Conclusion

We conclude by stating that no machine in this world is capable to match and replace a living being especially a human, but we try to consolidate this matter by giving the system a single human task which is to understand a person feeling and respond accordingly in a way to make him feel better and secure. We here using this system attempt to fixate a lack of emotional connection of a person and loneliness with help of key technologies like Machine Learning, Image processing. As a whole, we perform a scientific study on the technologies and their benefits with the fact that the way we are going to utilize them in the building of our system. Discussing the future scope, in reality, every object in this world deserves and requires betterment or up-gradation. A similar law applies to this system too, the betterment in the efficiency rates or refined conversation building, etc are feasible to embed in the proposed system. However, add on you try to infiltrate into the device the core remains constant which is user-system interaction and aid his emotional balance. This is the core of the proposal and remains unaltered.

1. References

[1] A Review paper on emotional intelligence: Models and Relationships with other constructs, Dr.SandhyaMehata, NamrataSingh,2013 (<https://www.researchgate.net/publication/331082949_A_Review_paper_on_emotional_intelligence_Models_and_relationship_with_other_constructs>)

[2] A Study on Emotional Intelligence At Work Place, Dr. Desti Kannaiah, Dr.R.Shanthi,2015 (<https://researchonline.jcu.edu.au/40340/1/40340%20Kannaiah%20and%20Shanthi%202015.pdf>)

[3] A study on emotion recognition method and its application using face image, Hyeon-Jung Lee, Kwang-Seok Hong, 2017 (https://ieeexplore.ieee.org/document/8191005A )

[4] Real-Time Analytics and Machine Learning by **IBM**. ([https://www.ibm.com/it-infrastructure/z/capabilities/real-time-analytics](about:blank))

[5] An Introduction to Neural Networks by **James A. Anderson**.(ISBN:978-02-623-1588-3)

[6]Fundamentals of Neural Networks by **Lauren Fausett**.(ISBN:978-81-317-0053-2, 813-17-0053-4)

[7] Data Communications and Computer Networks by **Michael Duck & Richard Read**   (ISBN: 978-81-317-2698-2)

[8] Image Processing using Partial Differential Equations (<https://www.lri.fr/~gcharpia/VisionSeminar/slides/2014-04-02-kornprobst-vist.pdf>)

[9] Python and Machine Learning for Dummies by **John Paul Mullar & Luca Massaron** (ISBN: 978-81-265-6305-0)