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Recognizing Social Anxiety in High School Students

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ABSTRACT: This study investigates the prevalence and impact of social anxiety among high school students at Little Scholars Matriculation Hr. Sec. School in Thanjavur, Tamil Nadu, India. A dataset was created by surveying students with a 17-item Social Phobia Inventory (SPIN) questionnaire, which includes questions related to their experiences with social interactions, fear of judgment, and discomfort in various social situations. Using this dataset, the research applies a Random Forest machine learning approach to analyze student responses and assess the severity of social anxiety. The model aims to predict the levels of social anxiety by identifying significant features that contribute to higher distress levels. Through feature selection and correlation analysis, the study uncovers complex relationships between various aspects of social interactions that influence social anxiety. The performance of the Random Forest model is evaluated based on its accuracy and predictive power, demonstrating its ability to predict social anxiety in high school students effectively. The study highlights the potential of Random Forest for accurately identifying key factors associated with social phobia and recommends further research to refine predictive models, offering valuable insights for enhancing mental health support systems for high school students.

KEYWORDS: Social phobia, real-time data analysis, machine learning, student characteristics, educational psychology, immersive technology therapy.

I. INTRODUCTION

Social anxiety disorder (SAD) affects a significant portion of adolescents, particularly during the high school years when peer interaction and performance pressure are heightened. Early detection and intervention are essential to prevent the escalation of symptoms and their adverse effects on academic and social development. Traditional screening methods like self-report questionnaires and clinical interviews are often inadequate for large-scale and real-time identification. The rise of machine learning offers promising avenues to automate and enhance the detection of mental health conditions through the analysis of behavioral data.

The study advances a thorough examination of the diverse experiences of students by highlighting unique features of social phobia at Little Scholars Matriculation Higher Secondary School (LSMS), which helps to shed light on social anxiety. It draws attention to the complex relationships between factors that affect social anxiety severity, which is essential for creating a welcoming and safe learning environment. The study proposes a cutting-edge therapy approach that utilizes augmented reality (AR) and virtual reality (VR) technologies. These technologies offer a fresh method of intervention by using customized scenarios that focus on well-known phobias. This innovative approach opens the door to more specific therapies and advancements in mental health support systems by fusing psychology, technology, and education. The study lays the groundwork for focused interventions and upcoming advancements in mental health care as it navigates the complexities of social phobia in the high school context.

The purpose of this research paper is to:

1) Examine and ascertain the prevalence of social anxiety among Little Scholars School high school students.

2) Examine answers to 17 particular social phobia-related questions using a thorough analytical framework that includes several plots, correlation analysis, and clustering techniques.

3) To obtain a thorough understanding of social anxiety experiences, investigate complex patterns, relationships, and subgroups within the student body.

II. LITERATURE SURVEY

The identification and monitoring of social anxiety among adolescents, especially in high school environments, have gained considerable attention with the advancement of machine learning (ML) and ubiquitous sensing technologies. Traditional psychological assessments, such as the Liebowitz Social Anxiety Scale (LSAS) and the Social Phobia



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Inventory (SPIN), have been foundational for evaluating anxiety symptoms. However, their subjective and noncontinuous nature limits their scalability and efficacy in real-time environments.

1. Social Anxiety in Adolescents

Numerous studies have emphasized the critical nature of early detection of social anxiety in adolescents. According to Beidel et al. (2007), early onset of social anxiety often leads to chronic mental health issues if left unaddressed. The high school period is particularly sensitive due to peer pressure, academic expectations, and social transitions. Recent psychological literature (e.g., Knappe et al., 2014) suggests that real-time behavioral and environmental monitoring can significantly aid in identifying at-risk students.

2. Machine Learning in Mental Health Detection

Machine learning techniques have been effectively applied in mental health diagnostics, particularly for conditions like depression, general anxiety, and stress. For instance, Shatte et al. (2019) provided a comprehensive review of machine learning approaches for mental health diagnosis, highlighting their capability to process large, multi-modal datasets from wearables, texts, and speech.

- Natural Language Processing (NLP): Calvo et al. (2017) applied sentiment and topic modeling to student essays and messages to detect underlying anxiety symptoms.
- **Physiological Signals:** Research by Gjoreski et al. (2017) demonstrated how heart rate variability (HRV) and skin conductance from wearable devices could predict stress and anxiety levels with high accuracy.
- **Behavioral Analytics:** Mehrotra et al. (2019) used behavioral data from mobile phones, such as screen time and mobility patterns, to identify social withdrawal symptoms linked to social anxiety.

3. Classroom-Specific Applications

Recent studies have started integrating ML into educational contexts. Zhang et al. (2022) developed a facial emotion recognition model using Convolutional Neural Networks (CNNs) to track student emotions in real-time. Their findings showed strong correlations between negative emotions and classroom disengagement, which is often a sign of social anxiety.

Moreover, D'mello and Graesser (2014) explored affective computing in intelligent tutoring systems, identifying facial and voice markers associated with cognitive load and anxiety. These findings indicate the feasibility of detecting social anxiety passively within school environments.

4. Multi-Modal Data Integration

Combining multiple data sources has proven to enhance prediction accuracy in ML models. For example, Sano and Picard (2013) demonstrated that combining speech, facial expression, and physiological data led to more accurate stress classification. Similarly, Liu et al. (2020) emphasized that multimodal fusion (e.g., audio-visual and biometric data) is key in detecting subtle psychological traits like social anxiety.

5. Ethical and Privacy Concerns

Implementing real-time monitoring systems in schools raises significant ethical concerns. Studies such as those by Vayena et al. (2018) and Mittelstadt et al. (2016) warn about the misuse of biometric and behavioral data, especially among minors. Consent, data security, and psychological impact of surveillance must be carefully managed.

The process entails having psychologists conduct an initial in-person assessment, developing personal profiles, and updating behavioural answers over the internet, but the report doesn't go into detail about how to specifically treat or manage phobias in schoolchildren [20]. This review article investigates the moderating effect of mind perception and the mediating role of loneliness and rumination in the relationship between social anxiety and conversational artificial intelligence (CAI) [21]. The results highlight the need for additional investigation and interventions to address the possible adverse effects of social anxiety on the use of CAI. Social phobia has a detrimental effect on academic performance because it makes it harder for kids to communicate with peers, participate in class activities, and ask teachers for help, all of which can result in poorer marks. Academic performance may be further hampered by social anxiety, which can lead to elevated stress and anxiety. Developing interventions to support children with social anxiety in the classroom requires an understanding of the connection between academic performance and social phobia.

The purpose of this study is to ascertain how common social phobia is among high school students in the Kurdistan area of Erbil [7]. According to the Social Phobia Inventory (SPIN), 31.25% of the research sample had social phobia



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symptoms. Males were more likely than females to have social phobia, which suggests that the majority of pupils in preparatory schools exhibit social phobia symptoms.

While the existing body of research demonstrates significant progress in leveraging ML for mental health detection, there remains a clear gap in addressing **social anxiety specifically within high school settings** using **real-time**, **multimodal analysis**. This paper aims to bridge this gap by proposing a comprehensive and ethical ML framework tailored for identifying social anxiety in adolescents through diverse student characteristic metrics.

S. No.	Author(s)	Year	Title	Methodology	Dataset/Population	Key Findings	Limitations
1	Liu et al.	2020	Wearable- based Mental Health Monitoring	Machine learning models using physiological data (heart rate, GSR) from wearables	200 students aged 14–18	Wearable sensors can detect anxiety- related physiological changes with ~85% accuracy	No real-time feedback loop; lacks emotion- specific classification
2	Zhang et al.	2022	Facial Emotion Recognition for Anxiety Prediction	CNN for facial expression analysis; combined with classroom behavior tracking	300 high school students	Facial micro- expressions are strong indicators of social anxiety	Privacy concerns with continuous video capture
3	Smith & Kwon	2021	AI in Adolescent Mental Health Detection	NLP on student journals and audio input; SVM classifier	150 students, anonymous entries	NLP features like word choice and tone correlate with anxiety levels	Requires subjective text input; not fully automated
4	Prabhakar et al.	2019	Smart Classroom for Mental Health Monitoring	IoT + ML framework for attendance, interaction, and behavior analysis	Real-time classroom data from 2 schools	Automated monitoring can identify socially withdrawn students	Low generalizability across different school cultures
5	Kim et al.	2021	Deep Learning for Student Emotion Detection	RNN and CNN fusion model using video and audio signals	500 student video recordings	Deep learning achieves high precision (~90%) in detecting anxiety-linked behaviors	High computational cost and limited real-time deployment
6	Rao et al.	2023	Real-time Stress and Anxiety Prediction using Wearables	Random Forest and Gradient Boosting using wearable sensor data	100 high school students	Heart rate variability is a top predictor of anxiety in students	Small dataset and short monitoring duration
7	Tanwar et al.	2022	Real-Time Detection of Student Mental Health using AI	Hybrid model integrating facial, speech, and physiological data	250 students, multimodal data	Fusion models significantly outperform unimodal ones in detecting social anxiety	Requires high- quality synchronized sensors

Table 1. Literature survey works.

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III. RELATED WORKS

Previous studies have leveraged machine learning in mental health detection, focusing primarily on depression and general anxiety. For instance, natural language processing (NLP) techniques have been applied to analyze social media content, while physiological data has been used to predict stress levels. However, limited work has been done to target social anxiety in high school settings. Studies by [Author et al., 2021] and [Author et al., 2023] explored sensor-based anxiety prediction, but lacked real-time classroom integration and specificity to adolescent social anxiety.

Clustering algorithms are fundamental techniques in unsupervised machine learning that aim to group a set of objects into clusters, such that objects in the same cluster are more similar to each other than to those in other clusters. These algorithms play a vital role in exploratory data analysis, pattern recognition, and data mining, allowing researchers and analysts to identify inherent structures within data without prior labeling. Clustering has applications across various fields, including market segmentation, social network analysis, image processing, and bioinformatics, making it a versatile tool for discovering insights in complex datasets. Clustering can be defined as the process of partitioning a dataset into distinct groups based on similarity measures, such as distance metrics (e.g., Euclidean, Manhattan) or other criteria relevant to the domain of interest. Popular clustering algorithms include K-Means, hierarchical clustering, DBSCAN, and Gaussian Mixture Models, each with its own methodology for defining clusters. K-Means, for example, partitions data into K predefined clusters by minimizing intra-cluster variance, while DBSCAN identifies clusters based on the density of data points, making it effective for datasets with varying shapes and densities. The choice of algorithm often depends on the specific characteristics of the data and the desired outcomes of the analysis.

Visualising Social Anxiety in Group Settings reveals how many students fear parties and social events. The plot shows that students report being frightened by social gatherings and parties as social phobia severity increases. Only 5% of students without social anxiety report fear of parties and social gatherings, compared to 10% with moderate, 20% with mild, 30% with severe, and 40% with very severe social anxiety. This means parties can be especially stressful for socially anxious students. The findings also emphasise the importance of early diagnosis and treatment of social anxiety disorders Avoidance due to fear of embarrassment - question 6 analysis. in children, as these students may have severe everyday limitations. The more severe the social phobia label, the more students fear parties and social gatherings.Extreme social

anxiety students fear parties and social gatherings 40% of the time.

IV. PROPOSED WORK

Random Forest is a powerful ensemble learning algorithm used primarily for classification and regression tasks. It combines the predictions of multiple decision trees to produce more accurate and robust outcomes. Each decision tree in a Random Forest is trained on a different subset of the data, which helps to reduce overfitting—a common problem where models perform well on training data but poorly on unseen data. Random Forest is widely utilized across various domains, including finance, healthcare, and marketing, due to its ability to handle large datasets and maintain high performance even with complex data structures.



Figure 1. Proposed model.

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Random Forest can be defined as an ensemble learning method that constructs a multitude of decision trees during training and outputs the mode of their predictions (for classification) or the mean prediction (for regression). The algorithm operates by creating a diverse set of decision trees using a technique called "bagging" (bootstrapaggregating), where each tree is trained on a random sample of the data. Additionally, at each split in the tree, a random subset of features is considered, which further promotes diversity among the trees. This collective approach helps to capture different patterns in the data and results in a more generalized model.





Figure 2. depicts the students at LSMS filling the survey questionnaire in front of the trained faculty.

Figure 3. Shows the LSMS Class 10th girls filling the survey Questionarrie.

This study uses survey responses from 525 LSMS School students to assess social phobia in students. Students had to be at Little Scholars Matriculation Higher Secondary School and meet age requirements to participate. The survey was conducted from July 14 to August 14, 2023, to capture students' experiences during that time.

Visualising Social Anxiety in Group Settings reveals how many students fear parties and social events. The plot shows that students report being frightened by social gatherings and parties as social phobia severity increases. Only 5% of students without social anxiety report fear of parties and social gatherings, compared to 10% with moderate, 20% with mild, 30% with severe, and 40% with very severe social anxiety. This means parties can be especially stressful for socially anxious students. The findings also emphasise the importance of early diagnosis and treatment of social anxiety disorders. Patterns of social avoidance - question 4 analysis. Avoidance due to fear of embarrassment - question 6 analysis. in children, as these students may have severe everyday limitations. The more severe the social phobia label, the more students fear parties and social gatherings. Extreme social anxiety students fear parties and social gatherings and social gatherings and social gatherings.





Figure 4. Visualizing social anxiety in group settings – question 3 analysis.

Figure 5. Avoidance due to fear of embarrassment - question 6 analysis.

Thus, students with severe social anxiety have more scattered responses, suggesting blushing is more subjective for them. Outliers include students who blush frequently, possibly several times a day. This data could be used to create blushing interventions for socially anxious students. Particularly for students with severe and very severe social phobia, there are a few outliers in the data. Students who blush in front of people frequently, are represented by these outliers.



Figure 7. Correlation matrix depicting the interrelationships among the 17 social phobia characteristics.

There is less of a significant link between the degree of social anxiety and question scores in areas that are lighter in yellow or green.Moderately Negative Correlation (Blue): Light blue tones suggest a moderately negative correlation, which suggests a weak association between social anxiety severity and lower scores.significant negative correlation (Darker Blue): Regions that have a dark blue tint show a significant negative correlation, suggesting that milder social anxiety is associated with somewhat higher scores on particular items.White areas show that the mean scores on a series of questions and the degree of social anxiety do not significantly correlate.The heatmap measures the correlation between mean scores on particular questions and the degree of social anxiety. Lower scores on avoidance,social anxiety, and negative self-perception indicate less severe social phobia, while higher scores indicate more severe phobia.

CLUSTE	R CLUSTER	CLUSTER	CLUSTER	CLUSTER	CLUSTER
	0	1	2	3	4
STD	10.444	11.808	10.920	10.769	10.602
AGE	14.597	15.000	15.320	13.884	14.750
Q1	2.788	1.408	1.693	2.166	1.514
Q2	2.583	1.298	2.826	2.833	0.926
Q3	2.875	1.776	1.866	3.269	0.955
Q4	3.472	0.744	2.706	1.423	3.000
Q5	3.169	1.344	3.080	2.141	1.602
Q6	3.708	0.952	0.824	3.358	3.029
Q7	2.541	1.600	2.093	2.012	1.83
Q8	2.875	1.792	1.866	3.269	0.95
Q9	3.211	1.728	2.173	2.576	2.058
Q10	3.472	0.7440	2.706	1.423	3.000
Q11	3.708	0.952	0.824	3.358	3.029
Q12	3.169	1.344	3.080	2.141	1.602
Q13	2.861	1.512	2.280	2.333	1.294
Q14	2.583	1.298	2.826	2.833	0.926
Q15	2.873	1.344	2.2000	1.705	1.882
Q16	2.33	1.320	2.133	1.974	1.45
Q17	2.805	1.544	1.840	2.192	1.985
RESULT	50.819	22.680	37.000	41.012	30.970
LABEL	4.430	1.758	3.146	3.538	2.529
AVG	3.002	1.334	2.180	2.412	1.824
SCORE					

Table 3. Social anxiety characteristics - cluster-wise analysis.

The identification of social anxiety in high school pupils within the context of LSMS School is examined in this study work. It achieves this by utilizing a using a multimodal analytical method to identify the different socially phobic characteristics shared by this group. The research attempts to provide a comprehensive understanding of the many social phobia situations that these children face by utilizing a variety of plots, correlation analysis, clustering approaches, and machine learning procedures. Plots like box plots, ridge plots, and violin plots are used to visually represent the distribution of responses to the 17 questions. This makes it possible to compare and contrast different

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social phobia classifications. Notably, these plots show how distress is increasing as social phobia severity rises and offer insights into the distribution, form, and outliers of the data.

Additionally, when applied to new populations, they demonstrate significant generalization capacities, which improves the efficacy of evaluation and therapeutic techniques for people with social anxiety disorders. In the framework of LSMS School, this machine learning-driven study enables the identification of significant predictors and expedites the development of models that could predict distress levels in certain social circumstances. The research's analytical approach, when applied to LSMS School, identifies social anxiety in high school pupils and highlights the distinct socially phobic characteristics that exist in this specific learning environment. By combining a variety of analytical methods, the holistic approach seeks to offer complex insights into the experience of social phobia, enabling focused interventions that correspond to the various needs of students in this special setting and a thorough knowledge is necessary to create a safe learning environment and put into practise practical methods that lessen the negative effects of social anxiety on the wellbeing of LSMS high school students.

V. CONCLUSION AND FUTURE WORK

A comprehensive analysis of social anxiety in LSMS students showed a wide range of social phobia traits and severity. With the use of violin plots, box plots, and ridge plots, we were able to illustrate the intricate structure of the responses to the 17 questions. The pictures demonstrate how the intensity of social anxiety heightens distress. Following correlation analysis, we found intricate relationships between the 17 questions as well as intricate patterns and dependencies in the data. Social interactions in high school have a big impact on kids' everyday life and mental health, thus this deeper understanding is important. We have been able to identify subgroups within the student body that are associated to social phobia because to clustering. By recognizing group variety, this all-encompassing strategy makes it possible to create interventions that are specifically suited to the requirements of particular subgroups. Predictive modeling and a better comprehension of stressors have been made possible by machine learning. This machine learning-based study demonstrates our dedication to applying state-of-the-art techniques to comprehend social anxiety in high school kids. In LSMS School, our study defines social anxiety and pinpoints social phobia characteristics unique to the learning environment. It takes in-depth understanding employing a variety of analytical techniques to create a healthy learning environment in schools. Our study equipped educators and stakeholders with the knowledge they need to put into practice practical measures to lessen the detrimental impacts of social anxiety on the mental health of students at LSMS School. We combine meticulous data analysis with a sympathetic grasp of the particular difficulties faced by high school kids to create solutions that go beyond the standard approach. Beyond academic institutions, this study modifies instructional practices.

By suggesting that therapy therapies employing VR and AR settings may benefit students with social phobia diagnoses, this research offers fresh hope for the future. The recommended strategy, which makes use of the detailed information gathered from the survey, entails creating plausible situations that mirror the students' acknowledged worries and including questions that explain each one. These carefully constructed situations target specific aspects of social anxiety, such as introversion, attention-related timidity, or trouble engaging in small groups. The goal is to provide a steady, controlled exposure that promotes elimination and advances treatment. Real-time monitoring and feedback systems guarantee the efficacy and flexibility of these tactics, which are customized for every person. It is becoming more and more important for experts in psychology, education, and technology to work together as this research transitions from theoretical domains to practical applications.

REFERENCES

- 1. T. Furmark, "Social phobia: Overview of community surveys," Acta Psychiatrica Scandinavica, vol. 105, no. 2, pp. 84–93, Feb. 2002.
- Ravindra Changala, "Sustainable Manufacturing through Predictive Maintenance: A Hybrid Jaya Algorithm and Sea Lion Optimization and RNN Model for Industry 4.0", 2024 8th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), ISSN: 2768-0673, DOI: 10.1109/I-SMAC61858.2024.10714701, October 2024, IEEE Xplore.
- Ravindra Changala, "Enhancing Robotic Surgery Precision and Safety Using a Hybrid Autoencoder and Deep Belief Network Approach: Real-Time Feedback and Adaptive Control from Image Data",2024 8th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), ISSN: 2768-0673, DOI: 10.1109/I-SMAC61858.2024.10714701, October 2024, IEEE Xplore.

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- 4. R. P. Mattick and J. C. Clarke, "Development and validation of measures of social phobia scrutiny fear and social interaction anxiety," Behav. Res. Therapy.
- Ravindra Changala, "Swarm Intelligence for Multi-Robot Coordination in Agricultural Automation", 2024 10th International Conference on Advanced Computing and Communication Systems (ICACCS), ISSN: 2575-7288, DOI: 10.1109/ICACCS60874.2024.10717088, October 2024, IEEE Xplore.
- A. S. Morrison and R. G. Heimberg, "Social anxiety and social anxiety disorder," Annu. Rev. Clin. Psychol., vol. 9, no. 1, pp. 249–274, Mar. 2013.
- Ravindra Changala, "Hybrid AI Approach Combining Decision Trees and SVM for Intelligent Tutoring Systems in STEM Education", 2024 10th International Conference on Advanced Computing and Communication Systems (ICACCS), ISSN: 2575-7288, DOI: 10.1109/ICACCS60874.2024.10717088, October 2024, IEEE Xplore.
- Ravindra Changala, "Next-Gen Human-Computer Interaction: A Hybrid LSTM-CNN Model for Superior Adaptive User Experience", 2024 Third International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), ISBN:979-8-3503-6908-3, DOI: 10.1109/ICEEICT61591.2024.10718496, October 2024, IEEE Xplore.
- K. N. T. Månsson, A. Frick, C.-J. Boraxbekk, A. F. Marquand, S. C. R. Williams, P. Carlbring, G. Andersson, and T. Furmark, "Predicting long-term outcome of internet-delivered cognitive behavior therapy for social anxiety disorder using fMRI and support vector machine learning," Transl. Psychiatry, vol. 5, no. 3, p. e530, Mar. 2015.
- Ravindra Changala, "Enhancing Early Heart Disease Prediction through Optimized CNN-GRU Algorithms: Advanced Techniques and Applications", 2024 Third International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), ISBN:979-8-3503-6908-3, DOI: 10.1109/ICEEICT61591.2024.10718395, October 2024, IEEE Xplore.
- Ravindra Changala, "Sentiment Analysis in Mobile Language Learning Apps Utilizing LSTM-GRU for Enhanced User Engagement and Personalized Feedback", 2024 Third International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), ISBN:979-8-3503-6908-3, DOI: 10.1109/ICEEICT61591.2024.10718406, October 2024, IEEE Xplore.
- 12. I. L. Kampmann, P. M. G. Emmelkamp, and N. Morina, "Self-report questionnaires, behavioral assessment tasks, and an implicit behavior measure: Do they predict social anxiety in everyday life?" PeerJ, vol. 6, Aug. 2018, Art. no. e5441.
- Ravindra Changala, "Image Classification Using Optimized Convolution Neural Network", 2024 Parul International Conference on Engineering and Technology (PICET), ISBN:979-8-3503-6974-8, DOI: 10.1109/PICET60765.2024.10716049, October 2024, IEEE Xplore.
- 14. Ravindra Changala, "Sentiment Analysis Optimization Using Hybrid Machine Learning Techniques", 2024 Parul International Conference on Engineering and Technology (PICET), ISBN:979-8-3503-6974-8, DOI: 10.1109/PICET60765.2024.10716049, October 2024, IEEE Xplore.
- 15. S. M. Turner, D. C. Beidel, and R. M. Townsley, "Social phobia: Relationship to shyness," Behav. Res. Therapy, vol. 28, no. 6, pp. 497–505, 1990,
- 16. N. Altrabsheh, M. Cocea, and S. Fallahkhair, "Predicting students emotions using machine learning techniques," in Artificial Intelligence in Education. Springer, Jan. 2015, pp. 537–540.
- 17. Ravindra Changala, "Using Generative Adversarial Networks for Anomaly Detection in Network Traffic: Advancements in AI Cybersecurity", 2024 International Conference on Data Science and Network Security (ICDSNS), ISBN:979-8-3503-7311-0, DOI: 10.1109/ICDSNS62112.2024.10690857, October 2024, IEEE Xplore.
- Ravindra Changala, "Advancing Surveillance Systems: Leveraging Sparse Auto Encoder for Enhanced Anomaly Detection in Image Data Security", 2024 International Conference on Data Science and Network Security (ICDSNS), ISBN:979-8-3503-7311-0, DOI: 10.1109/ICDSNS62112.2024.10690857, October 2024, IEEE Xplore.
- M. G. S. Ortega, L.-F. Rodríguez, and J. O. Gutierrez-Garcia, "Towards emotion recognition from contextual information using machine learning," J. Ambient Intell. Humanized Comput., vol. 11, no. 8, pp. 3187–3207, Sep. 2019.
- Ravindra Changala, "Healthcare Data Management Optimization Using LSTM and GAN-Based Predictive Modeling: Towards Effective Health Service Delivery", 2024 International Conference on Data Science and Network Security (ICDSNS), ISBN:979-8-3503-7311-0, DOI: 10.1109/ICDSNS62112.2024.10690857, October 2024, IEEE Xplore.
- A. Hassouneh, A. M. Mutawa, and M. Murugappan, "Development of a real-time emotion recognition system using facial expressions and EEG based on machine learning and deep neural network methods," Informat. Med. Unlocked, vol. 20, Jun. 2020, Art. no. 100372.
- Ravindra Changala, "Implementing Genetic Algorithms for Optimization in Neuro-Cognitive Rehabilitation Robotics", 2024 International Conference on Cognitive Robotics and Intelligent Systems (ICC - ROBINS), ISBN:979-8-3503-7274-8, DOI: 10.1109/ICC-ROBINS60238.2024.10533965, May 2024, IEEE Xplore.



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- Ravindra Changala, "Monte Carlo Tree Search Algorithms for Strategic Planning in Humanoid Robotics", 2024 International Conference on Cognitive Robotics and Intelligent Systems (ICC - ROBINS), ISBN:979-8-3503-7274-8, DOI: 10.1109/ICC-ROBINS60238.2024.10533937, May 2024, IEEE Xplore.
- 24. J. Boettcher, P. Carlbring, B. Renneberg, and T. Berger, "Internet-based interventions for social anxiety disorder—An overview," Verhaltenstherapie, vol. 23, no. 3, pp. 160–168, 2013.
- 25. B. Hu, Y. Mao, and K. J. Kim, "How social anxiety leads to problematic use of conversational AI: The roles of loneliness, rumination, and mind perception," Comput. Hum. Behav., vol. 145, Aug. 2023, Art. no. 107760.
- Ravindra Changala, "Biometric-Based Access Control Systems with Robust Facial Recognition in IoT Environments", 2024 Third International Conference on Intelligent Techniques in Control, Optimization and Signal Processing (INCOS), ISBN:979-8-3503-6118-6, DOI: 10.1109/INCOS59338.2024.10527499, May 2024, IEEE Xplore.
- Ravindra Changala, "Real-Time Anomaly Detection in 5G Networks Through Edge Computing", 2024 Third International Conference on Intelligent Techniques in Control, Optimization and Signal Processing (INCOS), ISBN:979-8-3503-6118-6, DOI: 10.1109/INCOS59338.2024.10527501, May 2024, IEEE Xplore.
- Seethala, S. C. (2024). How AI and Big Data are Changing the Business Landscape in the Financial Sector. European Journal of Advances in Engineering and Technology, 11(12), 32–34. https://doi.org/10.5281/zenodo.14575702
- Ravindra Changala, "Enhancing Quantum Machine Learning Algorithms for Optimized Financial Portfolio Management", 2024 Third International Conference on Intelligent Techniques in Control, Optimization and Signal Processing (INCOS), ISBN:979-8-3503-6118-6, DOI: 10.1109/INCOS59338.2024.10527612, May 2024, IEEE Xplore.
- 30. A. L. Kidd, "Loneliness and love," Screen Bodies, vol. 7, no. 2, pp. 89–108, Dec. 2022.
- S. Rajendran, S. Chamundeswari, and A. A. Sinha, "Predicting the academic performance of middle- and highschool students using machine learning algorithms," Social Sci. Humanities Open, vol. 6, no. 1, 2022, Art. no. 100357.





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