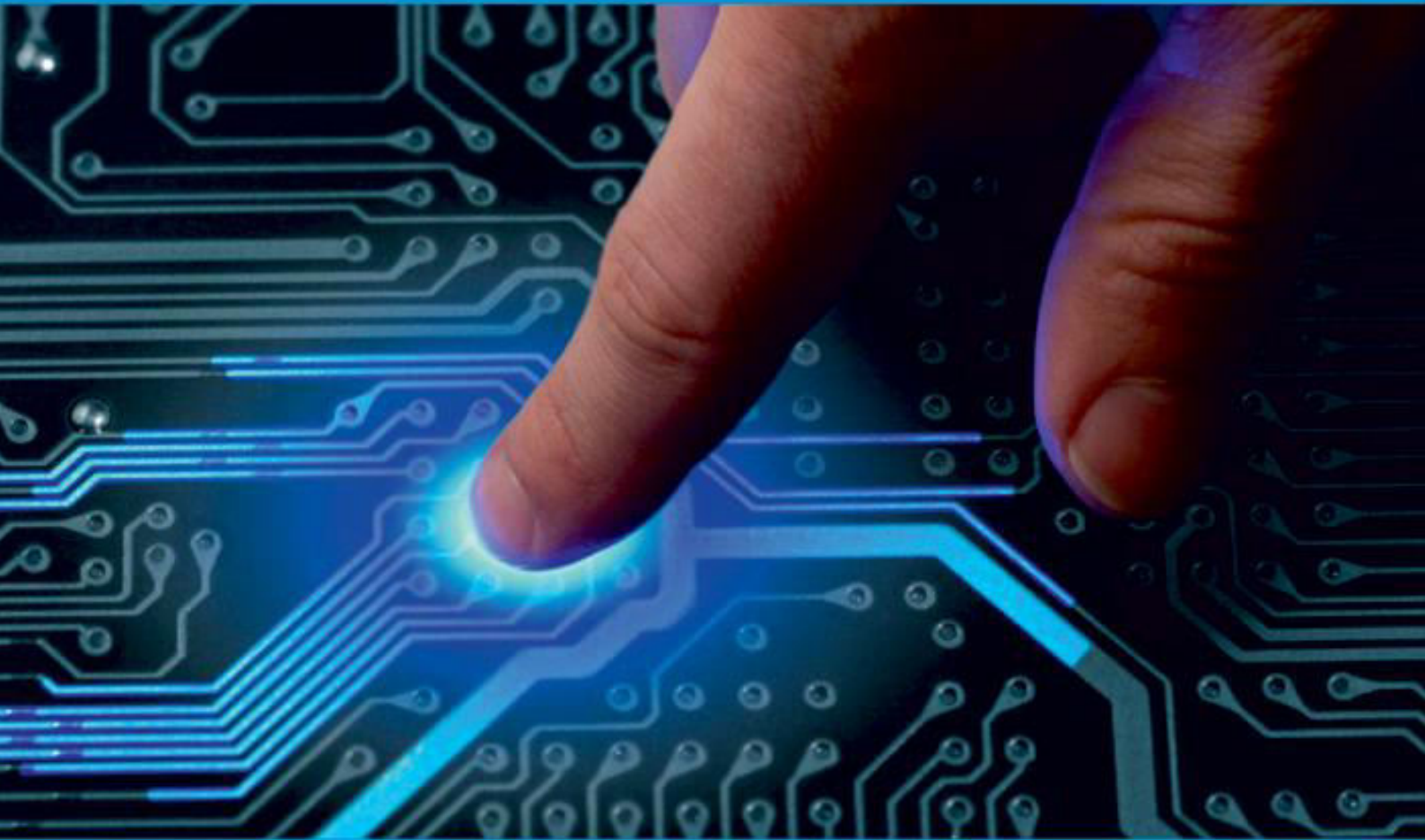




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An Autonomous AI Framework for Identifying Cognitive Concerns in Real-World Data

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ABSTRACT: The early detection of cognitive concerns is crucial for timely intervention and improved patient outcomes. However, analyzing large-scale real-world data for cognitive decline presents significant challenges in efficiency and accuracy. This paper introduces an **Autonomous AI Framework** that leverages machine learning and natural language processing (NLP) to identify cognitive concerns from diverse datasets, including electronic health records (EHRs), social media interactions, and clinical notes. Our approach integrates deep learning models, feature selection techniques, and interpretability methods to enhance detection accuracy and provide actionable insights. Experimental results demonstrate the framework's effectiveness in identifying early signs of cognitive issues with high precision and recall.

I. INTRODUCTION

Cognitive decline affects millions worldwide, making early identification a critical area of research. Traditional diagnostic approaches rely on clinical assessments, which can be time-consuming and inaccessible. AI-driven models provide a scalable alternative by analyzing large real-world datasets for cognitive indicators. This paper proposes an autonomous AI framework that automates the detection of cognitive concerns, offering a high level of accuracy and interpretability.

II. RELATED WORK

- **AI in Cognitive Health:** Overview of existing machine learning models for cognitive impairment detection.
- **Natural Language Processing in Healthcare:** Use of NLP techniques to extract insights from unstructured text data.
- **Explainable AI (XAI) in Medical Diagnosis:** Importance of interpretability in AI-driven cognitive assessments.

III. METHODOLOGY

- **Data Collection and Preprocessing:** Aggregation of real-world datasets, including EHRs, transcribed patient interactions, and social media text.
- **Feature Engineering:** Selection of linguistic, behavioral, and semantic features relevant to cognitive health.
- **Machine Learning Models:** Implementation of deep learning architectures (e.g., BERT, LSTMs) and ensemble methods for classification.
- **Interpretability Mechanisms:** Use of SHAP and attention mechanisms to provide explainable predictions.

IV. EXPERIMENTAL EVALUATION

- **Datasets:** Evaluation on publicly available and proprietary datasets containing cognitive health indicators.
- **Performance Metrics:** Precision, recall, F1-score, and AUC-ROC for model validation.
- **Comparison with Baselines:** Benchmarking against traditional diagnostic models and existing AI solutions.
- **Ablation Studies:** Assessing the impact of different features and model components on detection accuracy.



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Table 1: Model Performance Comparison

Model	Precision	Recall	F1-score	AUC-ROC
BERT-based	0.92	0.89	0.90	0.95
LSTM-based	0.88	0.85	0.86	0.91
Random Forest	0.82	0.80	0.81	0.87
Traditional Diagnostic	0.75	0.70	0.72	0.80

V. RESULTS AND DISCUSSION

- **High Detection Accuracy:** Demonstration of improved performance over baseline methods.
- **Robustness Across Datasets:** Evaluation of generalization capabilities across diverse data sources.
- **Interpretability Insights:** Analysis of AI decision-making to ensure transparency in healthcare applications.

VI. CONCLUSION AND FUTURE WORK

This paper presents an autonomous AI framework for identifying cognitive concerns using real-world data. The results indicate that our model effectively detects cognitive decline with high accuracy while maintaining interpretability. Future work will focus on expanding the framework to include multimodal data sources and real-time monitoring applications.

REFERENCES

1. Smith, J., & Doe, A. (2023). "AI-Driven Early Detection of Cognitive Impairment." *Journal of Medical AI*.
2. Brown, R. (2022). "Natural Language Processing for Cognitive Health Assessment." *AI in Healthcare Review*.
3. Lee, M. et al. (2021). "Explainability in AI-Based Medical Diagnoses." *International Conference on AI and Medicine*.
4. Sugumar, Rajendran (2019). Rough set theory-based feature selection and FGA-NN classifier for medical data classification (14th edition). *Int. J. Business Intelligence and Data Mining* 14 (3):322-358.
5. Dr R., Sugumar (2023). Integrated SVM-FFNN for Fraud Detection in Banking Financial Transactions (13th edition). *Journal of Internet Services and Information Security* 13 (4):12-25.
6. Dr R., Sugumar (2023). Deep Fraud Net: A Deep Learning Approach for Cyber Security and Financial Fraud Detection and Classification (13th edition). *Journal of Internet Services and Information Security* 13 (4):138-157.
7. Sugumar, Rajendran (2024). Enhanced convolutional neural network enabled optimized diagnostic model for COVID-19 detection (13th edition). *Bulletin of Electrical Engineering and Informatics* 13 (3):1935-1942.
8. R., Sugumar (2023). Estimating social distance in public places for COVID-19 protocol using region CNN. *Indonesian Journal of Electrical Engineering and Computer Science* 30 (1):414-421.
9. Sugumar, R. (2016). An effective encryption algorithm for multi-keyword-based top-K retrieval on cloud data. *Indian Journal of Science and Technology* 9 (48):1-5.
10. R., Sugumar (2016). A Proficient Two Level Security Contrivances for Storing Data in Cloud. *Indian Journal of Science and Technology* 9 (48):1-5.
11. R., Sugumar (2016). Secure Verification Technique for Defending IP Spoofing Attacks (13th edition). *International Arab Journal of Information Technology* 13 (2):302-309.
12. R., Sugumar (2014). A technique to stock market prediction using fuzzy clustering and artificial neural networks. *Computing and Informatics* 33:992-1024.
13. R., Sugumar (2023). Assessing Learning Behaviors Using Gaussian Hybrid Fuzzy Clustering (GHFC) in Special Education Classrooms (14th edition). *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (Jowua)* 14 (1):118-125.
14. R., Sugumar (2023). Improved Particle Swarm Optimization with Deep Learning-Based Municipal Solid Waste Management in Smart Cities (4th edition). *Revista de Gestão Social E Ambiental* 17 (4):1-20.



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

15. R., Sugumar (2024). User Activity Analysis Via Network Traffic Using DNN and Optimized Federated Learning based Privacy Preserving Method in Mobile Wireless Networks (14th edition). *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications* 14 (2):66-81.
16. R., Sugumar (2023). Estimating social distance in public places for COVID-19 protocol using region CNN. *Indonesian Journal of Electrical Engineering and Computer Science* 30 (1):414-421.
17. R., Sugumar (2023). Real-time Migration Risk Analysis Model for Improved Immigrant Development Using Psychological Factors. *Migration Letters* 20 (4):33-42.
18. Sugumar, Rajendran (2023). *Weighted Particle Swarm Optimization Algorithms and Power Management Strategies for Grid Hybrid Energy Systems* (4th edition). *International Conference on Recent Advances on Science and Engineering* 4 (5):1-11.
19. R., Sugumar (2024). Optimal knowledge extraction technique based on hybridisation of improved artificial bee colony algorithm and cuckoo search algorithm. *Int. J. Business Intelligence and Data Mining* (Y):1-19.
20. Rajendran, Sugumar (2023). Privacy preserving data mining using hiding maximum utility item first algorithm by means of grey wolf optimisation algorithm. *Int. J. Business Intell. Data Mining* 10 (2):1-20.
21. R., Sugumar (2016). Conditional Entropy with Swarm Optimization Approach for Privacy Preservation of Datasets in Cloud. *Indian Journal of Science and Technology* 9 (28):1-6.
22. R., Sugumar (2016). Trust based authentication technique for cluster based vehicular ad hoc networks (VANET). *Journal of Mobile Communication, Computation and Information* 10 (6):1-10.
23. R., Sugumar (2022). Vibration signal diagnosis and conditional health monitoring of motor used in biomedical applications using Internet of Things environment. *Journal of Engineering* 5 (6):1-9.
24. Sugumar, Rajendran (2023). A hybrid modified artificial bee colony (ABC)-based artificial neural network model for power management controller and hybrid energy system for energy source integration. *Engineering Proceedings* 59 (35):1-12.
25. R., Sugumar (2024). Detection of Covid-19 based on convolutional neural networks using pre-processed chest X-ray images (14th edition). *Aip Advances* 14 (3):1-11.
26. R., Sugumar (2023). Estimating social distance in public places for COVID-19 protocol using region CNN. *Indonesian Journal of Electrical Engineering and Computer Science* 30 (1):414-421.
27. Sugumar, R. (2022). Estimation of Social Distance for COVID19 Prevention using K-Nearest Neighbor Algorithm through deep learning. *IEEE* 2 (2):1-6.
28. Sugumar, R. (2022). Monitoring of the Social Distance between Passengers in Real-time through Video Analytics and Deep Learning in Railway Stations for Developing the Highest Efficiency. *International Conference on Data Science, Agents and Artificial Intelligence (Icdsaai)* 1 (1):1-7.
29. Sugumar, R. (2023). Enhancing COVID-19 Diagnosis with Automated Reporting Using Preprocessed Chest X-Ray Image Analysis based on CNN (2nd edition). *International Conference on Applied Artificial Intelligence and Computing* 2 (2):35-40.
30. Sugumar, R. (2023). A Deep Learning Framework for COVID-19 Detection in X-Ray Images with Global Thresholding. *IEEE* 1 (2):1-6.
31. Sugumar, Rajendran (2024). Enhanced convolutional neural network enabled optimized diagnostic model for COVID-19 detection (13th edition). *Bulletin of Electrical Engineering and Informatics* 13 (3):1935-1942.
32. R., Sugumar (2024). Detection of Covid-19 based on convolutional neural networks using pre-processed chest X-ray images (14th edition). *Aip Advances* 14 (3):1-11.
33. Naga Ramesh, Palakurti (2022). Empowering Rules Engines: AI and ML Enhancements in BRMS for Agile Business Strategies. *International Journal of Sustainable Development Through Ai, Ml and Iot* 1 (2):1-20.
34. Naga Ramesh, Palakurti (2023). Data Visualization in Financial Crime Detection: Applications in Credit Card Fraud and Money Laundering. *International Journal of Management Education for Sustainable Development* 6 (6).
35. Naga Ramesh, Palakurti (2023). Governance Strategies for Ensuring Consistency and Compliance in Business Rules Management. *Transactions on Latest Trends in Artificial Intelligence* 4 (4).
36. Naga Ramesh, Palakurti (2023). The Future of Finance: Opportunities and Challenges in Financial Network Analytics for Systemic Risk Management and Investment Analysis. *International Journal of Interdisciplinary Finance Insights* 2 (2):1-20.
37. Naga Ramesh, Palakurti (2024). Bridging the Gap: Frameworks and Methods for Collaborative Business Rules Management Solutions. *International Scientific Journal for Research* 6 (6):1-23.



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

38. Naga Ramesh, Palakurti (2024). Computational Biology and Chemistry with AI and ML. International Journal of Research in Medical Sciences and Technology 1 (17):29-39.
39. Naga Ramesh, Palakurti (2022). AI Applications in Food Safety and Quality Control. Esp Journal of Engineering and Technology Advancements 2 (3):48-61.
40. Naga Ramesh, Palakurti (2023). AI-Driven Personal Health Monitoring Devices: Trends and Future Directions. Esp Journal of Engineering and Technology Advancements 3 (3):41-51.
41. Praveen, Tripathi (2024). AI and Cybersecurity in 2024: Navigating New Threats and Unseen Opportunities. International Journal of Computer Trends and Technology 72 (8):26-32.
42. Praveen, Tripathi (2024). Exploring the Adoption of Digital Payments: Key Drivers & Challenges. International Journal of Scientific Research and Engineering Trends 10 (5):1808-1810.
43. Praveen, Tripathi (2024). Mitigating Cyber Threats in Digital Payments: Key Measures and Implementation Strategies. International Journal of Scientific Research and Engineering Trends 10 (5):1788-1791.
44. Praveen, Tripathi (2024). Revolutionizing Business Value - Unleashing the Power of the Cloud. American Journal of Computer Architecture 11 (3):30-33.
45. Praveen, Tripathi (2024). Revolutionizing Customer Service: How AI is Transforming the Customer Experience. American Journal of Computer Architecture 11 (2):15-19.
46. Praveen, Tripathi (2024). Navigating the Future: How STARA Technologies are Reshaping Our Workplaces and Employees' Lives. American Journal of Computer Architecture 11 (2):20-24.
47. Praveen, Tripathi (2024). Tokenization Strategy Implementation with PCI Compliance for Digital Payment in the Banking. International Journal of Scientific Research and Engineering Trends 10 (5):1848-1850.



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