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Mental IQ Detection Using Machine Learning: A Review Paper

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Abstract: ***A Mental IQ Detection using the ML technology is software based application which is designed to detect the mental IQ with their age.[1]Machine Learning is that develops algorithms by learning the hidden patterns of the datasets used it to make predictions on new similar type data. We are using Machine learning for the mental IQ detection because we can improve accuracy of the software application, it has large amount of data Making predictions about future event ML has wide range of libraries and algorithm that are available.[2]We will be using KNN Algorithm, Logistic Algorithm, Linear Algorithm, etc. IQ test continue to be one of most reliable tools to measure intelligence skills of the human. The Intelligence Quotient (IQ) tests and the corresponding psychometric explanations dominate both the scientific and popular views about human intelligence. It starts with getting information from registration form using java on android studio, where each user will have to give test series provided by the developer.[3] After user gives test series, that's where ML comes in where we need to process the date using different libraries and algorithms to detect the Mental IQ of the user with their age, ensuring transparency and security of each user***

Keywords: Mental IQ detection, cognitive evaluation, mental health

I. INTRODUCTION

IQ measures intelligence based on a person's ability to reason using logic. Intelligence testing asks participants questions that tests their memory, pattern recognition, and problem-solving capabilities The test ultimately measures where an individual falls on a scale of intelligence based on other people in that age group. Formally referred to as "intellectual quotient" tests, IQ tests come in many forms. They can help diagnose intellectual disabilities or measure someone's intellectual potential [1]. If you're considering IQ testing. Intelligence refers to an individual's global mental capacities, and intelligence tests essentially measure an individual's rational and abstract thinking. They are designed to measure the global mental capacities of an individual in terms of verbal comprehension, perceptual organization, reasoning, and so on.[2]The goal is generally to assess the subject's aptitude for a certain vocation or academic study. A set of exercises meant to evaluate the ability to construct abstractions, learn, and deal with unexpected situations comprise intelligence testing[3]. Recent research has shown that using digital tools like apps and websites can help assess mental health and brain skills. These tools are handy for detecting issues like feeling sad or worried.[4] They've also made it easier to measure how well someone thinks, like solving problems and remembering stuff. Some tests even adjust questions based on how you're doing to give better results. People have started to realize that it's important to look at both mental health and thinking skills at the same time, but there aren't many apps that do both.[3] Also, some apps use clever computer programs to suggest things that can help improve mental health. All these findings show that the "Mental IQ Detection" project is on the right track, as it aims to combine these ideas and use technology to help people understand their mental health and thinking skills better.

II. BACKGROUND AND OVERVIEW

A. What is Mental IQ ?

It referred to as "intellectual quotient" tests, IQ detection come in many forms. They can help diagnose intellectual disabilities or measure someone's intellectual potential. If you're considering IQ detection[8]

B. What is ml ? Why ml is used ?

Machine Learning is that develops algorithms by learning the hidden patterns of the datasets used it to make predictions on new similar type data

1) Improve accuracy
2) Large amount of data
3) Making predictions about future event

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C. Why IQ Testing is Important?

IQ detection can be administered and used for a number of reasons. The most common reason why a parent would be seeking to find out their child's IQ is to 'diagnose' poor school performance.

For adults, the most common reason for wanting an intelligence quotient test is for career guidance or to determine job suitability.

III.MACHINE LEARNING AND IQ DETECTION

1) *Assessment Modules:* The project includes the development of modules for mental health assessment and cognitive evaluation, utilizing both image-based and audio-based tests.[9]
2) *Machine Learning Integration:* The project integrates machine learning algorithms for personalized recommendations based on assessment results, with a focus on mental health improvement and cognitive skills enhancement.[8]
3) *Android Application:* The project centers around the creation of an Android application that serves as the platform for users to undergo assessments and receive recommendations.
4) *User Privacy and Data Security:* The project places significant emphasis on ensuring the privacy and security of user data, implementing encryption, authentication, and compliance with data protection regulations.
5) *User Engagement:* The application aims to engage users through user-friendly design, gamification elements, and personalized recommendations.
6) *Feedback Mechanism:* The project includes mechanisms for user feedback, allowing for continuous improvement and refinement of the recommendation system and assessment modules.
7) *Documentation and Reporting:* Comprehensive documentation and reporting of the project's development, including data collection, machine learning model training, user testing, and evaluation.

IV.LITERATURE REVIEW

In today's fast-changing world, taking care of our mental health and cognitive abilities is more important than ever. The "Mental IQ Detection" project is highly relevant due to several key factors[6]

Firstly, there's a growing concern about mental health issues like depression, anxiety, and stress, making early detection and intervention crucial[2].

Additionally, cognitive skills such as problem-solving, memory, and creativity are vital for success in school and work. Recognizing one's strengths and areas for improvement in these skills is essential for personal growth and career advancement. [4]

Furthermore, the project's integration of machine learning recommendation systems adds an innovative dimension to addressing these challenges. By using advanced algorithms, the application provides personalized recommendations tailored to each user's assessment results, further enhancing its user-friendliness and effectiveness. In essence, "Mental IQ Detection" empowers individuals to take control of their mental well-being and cognitive growth, offering a comprehensive and cutting-edge solution for healthier, more fulfilling lives.[6]

In recent years, there have been studies attempting to predict IQ from brain imaging data. These studies use techniques like fMRI (functional magnetic resonance imaging) and machine learning algorithms to analyze brain activity patterns and attempt to correlate them with IQ scores[7]

Predicting IQ from Brain Imaging Data[10]

Cognitive Assessment and Educational Technology[11]

A. Personality and Intelligence Assessment[12]

Some research focuses on combining personality and cognitive assessments to gain a more holistic understanding of an individual's abilities and tendencies. This includes studies using machine learning to predict IQ from personality traits.

V. PROPOSED METHODOLOGY

The primary objective of the "Mental IQ Detection" project is to develop an Android application that combines machine learning-based recommendation systems with cognitive and mental health assessments.

The experimental work for the "Mental IQ Detection" project involving machine learning-based recommendation systems for mental health assessment and cognitive enhancement will require careful planning and consideration. By using KNN, linear & logistic algorithm we can recommend the user with the mental IQ.

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VI. CHALLENGES

Interpreting machine learning models for iq detection can be challenging due to several factors. here are some of the key challenges associated with understanding and interpreting these models:

1) *Complexity of Model Architecture:* Many machine learning models, especially deep neural networks, can be highly complex with numerous layers and thousands or even millions of parameters. this complexity makes it difficult to intuitively understand how the model arrives at its predictions.[13]
2) *Black-box Nature:* Deep learning models are often considered "black boxes" because they lack transparency in their decision-making processes. they transform inputs into outputs through a series of mathematical operations that are not readily interpretable by humans.
3) *Feature Transformation:* Machine learning models transform input features into higher-dimensional representations, making it hard to interpret how specific input features are weighted or contribute to the final prediction.
4) *Non-linear Relationships:* Machine learning models can capture non-linear relationships between features and iq scores, which can be challenging to represent and visualize.
5) *Overfitting:* Models may overfit the training data, learning to capture noise or irrelevant patterns. interpreting such models can lead to the incorrect attribution of importance to non-informative features.

VII. ADVANTAGES

1) *Assessment:* ML algorithms provide an objective and consistent way to assess an individual's mental IQ. This reduces the potential for human bias and subjectivity in evaluation[16].
2) *Efficiency:* ML can process and analyze vast amounts of data quickly, making it efficient for assessing cognitive and emotional abilities, potentially saving time for both individuals and professionals.
3) *Data Integration:* ML can integrate and analyze data from various sources, such as psychological assessments, brain imaging, and behavioral patterns. This holistic approach provides a more comprehensive view of mental IQ.
4) *Personalization:* ML models can be personalized to an individual's unique profile, taking into account their strengths and weaknesses, providing tailored insights and recommendations.
5) *Early Detection:* ML can identify subtle changes in cognitive and emotional states, enabling early detection of potential issues or declines in mental IQ. This is particularly valuable in mental health and cognitive disorders.[14]
6) *Scalability:* ML models can be scaled to assess a large number of individuals simultaneously, making it feasible to conduct assessments on a broader population and contributing to public health and research initiatives.
7) *Continuous Monitoring:* ML enables real-time or continuous monitoring of mental IQ, which can assist in tracking progress and making timely interventions when necessary.
8) *Cost-Effective:* ML-based assessments can be cost-effective in the long run, as they reduce the need for extensive human resources and manual evaluations, making mental IQ assessments more accessible to a broader range of individuals.
9) *Non-Invasive:* Many ML-based assessments do not require invasive procedures or extensive testing, making them more user-friendly and less intimidating than traditional assessments.

VIII. CONCLUSION

In conclusion, the application of Machine Learning (ML) in the detection and assessment of mental intelligence quotient (IQ) holds great promise for advancing our understanding of human cognition and emotional well-being. ML algorithms have the potential to provide valuable insights into an individual's mental abilities, strengths, and weaknesses by analysing various data sources, such as psychological assessments, brain imaging, and behavioural patterns[10].

In future for mental IQ detection we can also apply AI with face reorganization for detecting emotions of the user by providing them audio/video of medication sound. [18]

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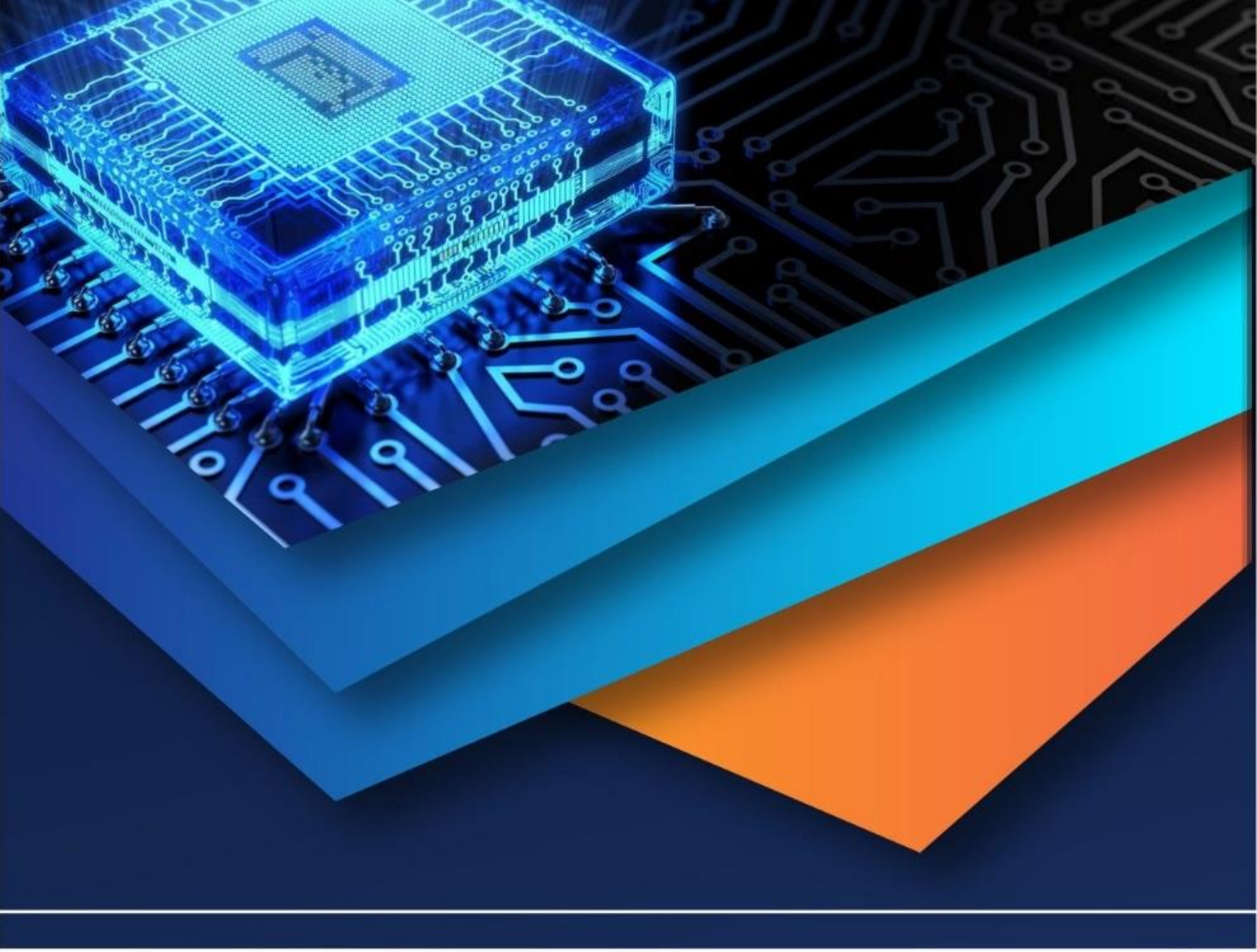
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