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Augmented Reality And Virtual Reality in Medical

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ABSTRACT:

This research explains the use of augmented reality (AR) and Virtual Reality (VR) in the medical field. The main concern of this paper as technology advances mobile device usage has been in gradually increased in AR and VR for example it has been used in medical fields like medical education and training, surgical simulation, psychotherapy, and telemedicine as a result of this technology the traditional medical care and malpractice caused by AR and VR have reduced education. AR and VR technology have created a new opportunity in medical patients-as-user application has help the medical student through virtual operations and functions for better understanding. At medical level consumer-level virtual and augmented reality systems are used to help customers to adapt and interact through AR and VR applications. It provides a conceptual framework for viewing and experiencing reality.

Keywords: Augmented Reality, Virtual Reality, Medical Practice, Healthcare Education.

1. INTRODUCTION

Virtual Reality (AR) technology creates a simulated 3D environment through VR headsets, while Augmented reality (AR) overlays virtual elements onto the real world using live video on electronic devices. VR has been in development for 50 years, while AR is a newer concept. Bothaim to engage the user's visual and auditory senses through creative immersive experiences. The Virtual medical system's interface is to design serve as a conduit for communication and data exchange between humans and machines. It encompasses the software 's overall design for human-computer interaction, operational procedures, and aesthetically pleasing interface. A user-friendly interface design not only imparts a sense of personality and style to the user but also streamlines the user's operational process, enhancing user comfort and freedom. Additionally, it effectively showcases the software's unique features and functions.

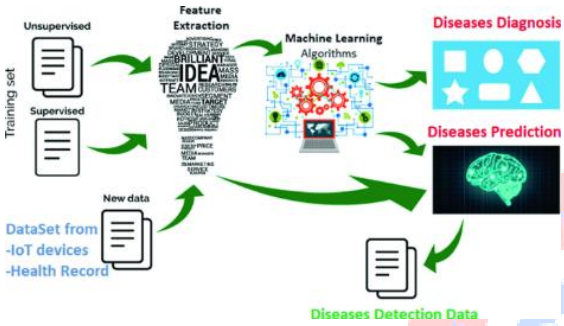
2. Literature review

Augmented Reality (AR) and Virtual Reality(VR) technology have been integrated into medical practice for education and many others. They have demonstrated the use of AR in enhancing surgical precision and reducing operation time by overlaying critical anatomical information directly into the surgical field. The potential of AR is invasive surgeries, offering surgeons more intuitive surgeries and a more understanding of patient anatomy without the need to look away from the surgical area. The Virtual Reality simulations provide immersive, risk-free environments for medical students and professionals to practice procedures and emergency responses. Virtual Reality has been found to enhance learning and skill update as compared to traditional methods. It has been utilized in personal exercise for patients recovering from strokes or injuries. The use of VR in pain management particularly in chronic pain conditions the immersive nature of VR was found to help patients focus away from pain. Augmented Reality could assist healthcare providers in diagnosing and treating patients with relevant data and 3D models during virtual appointments. Augmented Reality and Virtual Reality applications beyond training and AR-assisted diagnostic tools, which helped radiologists to interpret complex imaging data more accurately and efficiently. VR is used in psychological treatments such as exposure therapy for anxiety disorder. Despite these advances, challenges remain. Issues such as the high cost of AR and VR systems, the need for extensive training for healthcare professionals, and concerns about data security and patient privacy are recurrent themes in the literature. While AR and VR have shown promise further research is necessary to validate their effectiveness across different medical fields and patient demographics.

3. METHODOLOGY:

1. Disease Diagnosis and Prediction in AR Environment.

The first step of this approach consists of gathering large sets of clinical data and the subsequent preprocessing for quality control. It isolates the key features - age, sex, region, and symptoms presented by the patient to name a few; and creates labelled data sets out of them to train the Naive Bayes classifier. The classifier is embedded into an AR application and can do disease forecasting based on binary vision results from patients via live updating. During consultations, it helps healthcare providers by overlaying diagnostic information on patient profiles and hence improves accuracy as well as faculty to diagnose more rapidly.



2. Treatment Plan Recommendations in VR Simulations

In VR simulations for treatment plan recommendation, a full dataset of treatment plans and outcomes are aggregated and pre-processed to normalize them. Extract treatment type, duration, and whether a patient responds or experiences side effects. The data is trained on a model like Naive Bayes to provide personalized treatment for patients based on the information from the patient. The trained model is then deployed into a VR environment, where it gives healthcare professionals the ability to step through different treatment scenarios and visualize predicted outcomes - ultimately improving decision-making about patient care.

3. Patient Monitoring and Alert Systems in AR

The approach has the potential to employ augmented reality (AR) in improving real-time patient monitoring. Information from wearable devices such as heart rate and blood pressure is gathered and pre-processed. The key health indicators are extracted and used to train a Naïve Bayes classifier for the detection of anomalies. Healthcare providers can then use this trained model in an AR application that tracks patients in real-time, providing alerts, and overlaying important information about the state of the patient when a potential health risk is identified.

4. Medical Image Analysis and Diagnosis in VR

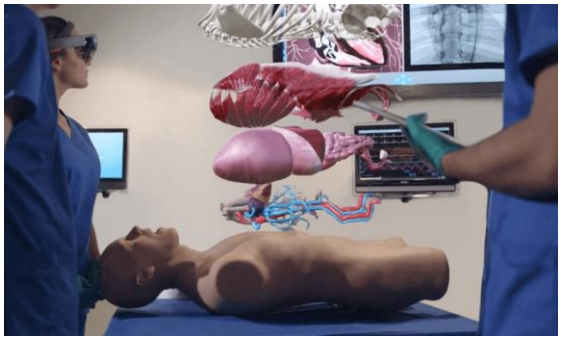
Naïve Bayes algorithms are used to improve diagnostic accuracy in virtual reality medical image analysis

and diagnosis. This process entails gathering and preprocessing healthcare images such as X-rays, MRIs, and CT scans to obtain main attributes that point out specific diseases. There is a Naïve Bayes classifier for diagnosing maladies from the pictures. It integrates a 3D model into VR so physicians can interact with it for better comprehension. The VR setup helps in providing accurate diagnoses or decisions by making them immersive and involving.

5. AR-based Medical Education and Training

This method involves the collection of educational data sets like case studies and treatment outcomes which are then pre-processed to standardize them.

Significant academic indicators like symptoms and diagnosis criteria are extracted from this. Consequently, a Naïve Bayes classifier is trained to generate learning materials as well as test items. An AR app is designed specifically for medical students that present interactive classes with a display of case studies, quizzes to students, and feedback hence increasing immersive technology in learning.



4. IMPLEMENTATION:

The medical sector has been transformed in a number of ways by the emergence of Augmented Reality (AR) and Virtual Reality (VR), including the way surgical training is done, and how patients are treated. These developments can further be improved by incorporating

Naïve Bayes algorithms to make it easier for doctors to diagnose accurately and have personalized patient care. Used a dataset of cancer predictions which includes columns vr_mean_radius, vr_mean_texture, vr_mean_area, vr_mean_perimeter, vr_mean_smoothne and diagnosis.

The dataset gives the output of accuracy, precision, and F1 score of the given dataset.

● Using a naïve Bayes algorithm we implement the accuracy, precision, and f1 score of a particular dataset and find out the predictions. Using this algorithm made it easy to predict and understand a particular dataset and the patient's details.

● The formula used for the predictions is:

1. Accuracy:

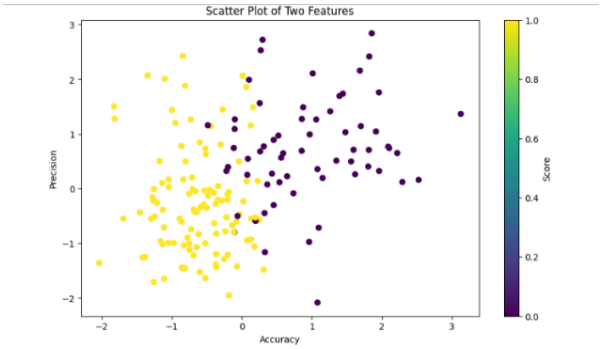
Accuracy = accuracy_score (y_test, y_pred)

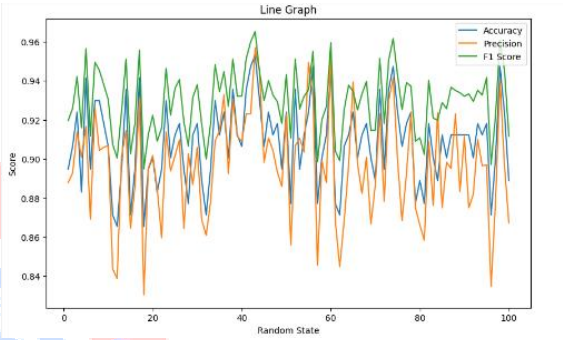
2. Precision:

Precision = precision_score (y_test, y_pred)

3. F1 Score:

F1 = f1_score (y_test, y_pred)

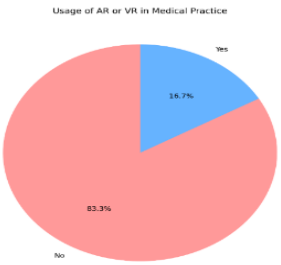




5. THE GITHUB LINK:

https://github.com/Pavankalyan6844/Ar-Vr-medical-Research.git

6. SURVEY FROM VARIOUS HOSPITAL DOCTORS:



According to this survey, we got some responses from doctors from various hospitals. According to responses only 16.7% of people have implemented and experienced these augmented reality and virtual reality tools. Others 83.3% have not experienced this by this we get to know that still this technology has not been reached all over India. This is because of the

high cost, lack of technical expertise, lack of understanding, and use of these emerging technologies. As the scientific network maintains to recognize the transformative capability of AR and VR, addressing those limitations will be vital for wider implementation and maximizing the impact of this revolutionary technology on affected person care and clinical schooling.

7. CONCLUSION:

In conclusion, the integration of AR and VR within the clinical subject, augmented with the Naive Bayes algorithm, gives a promising yet underutilized advancement in healthcare. Despite the proven capacity of these technologies to decorate diagnostic accuracy and affected personal care, a recent survey from numerous hospitals famous that 83.3% have no longer followed AR and VR for scientific functions and at the same time as best 16.7% have started to contain these improvements. This disparity highlights a giant possibility for increase and training in the clinical community. By addressing barriers to adoption and showcasing the hit implementation and benefits of AR, VR, and machine learning, the healthcare industry can flow towards a greater superior, efficient, and patient-centric future.

8. USE CASE:

https://youtu.be/z3owLTiEGJ4?feature=shared

https://youtu.be/0_2JWdIQlhw?feature=shared

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