CHAPTER 1

INTRODUCTION

1.1 TRADITIONAL LEARNING METHOD

Traditional learning is a conventional style of education that takes place in a physical location where the teachers are present inside the classroom and direct the learning process and the students acquire knowledge. It is a teacher's centric method that involves instruction from teachers through lectures, discussions, storytelling, textbooks and memorizing. The teachers play a dominant role in the classroom. In this conventional method, the emphasis is placed on teachers for providing information rather than encouraging the students to build and explore knowledge of their own.

1.1.1 Importance of Traditional Teaching

Traditional learning forms the foundation of today's education system. It established practices and structured methods which have shaped the educational institutions functions providing a reliable and proven framework for delivering knowledge.

Traditional learning a major role in instilling discipline and a sense of routine in students' life. It adheres to set schedules and norms that nurture life skills such as punctuality, time management and responsibilities.

The classroom – based learning encourages direct interaction between teachers and students enabling instant feedback, doubt clarification and emotional connection. Peer interaction enhances communication skills, teamwork and social development.

Traditional education follows a structured curriculum across regions ensuring consistency in learning. This consistency simplifies the evaluation of students' performance and facilitates the implementation of test and certification.

1.1.2 Challenges in Traditional Education

Few challenges faced by traditional education are listed below.

Lack of flexibility

Flexibility in learning means involving students to engage in accessing information anytime and anywhere for better understanding. Due to lack of such flexibility in

Reliable tracking is dependent on complex computer vision algorithms which should provide identification of the object and its continuous position and attitude estimation in the real environment. For this, feature-based tracking, SLAM-simultaneous localization and mapping, and marker tracking methods can be used. The advancements in deep learning techniques have also improved the accuracy and reliability of such tracking systems leading to interactive AR applications.

1.5 DEEP LEARNING

Deep learning can be defined as a branch of machine learning consisting of multiple hidden layers for processing data and uses Artificial Neural Network to acquire knowledge from data. The structure of deep learning is like brain's framework. Deep learning network comprises of input layer, multiple hidden layers and an output layer. The input is fed into the network through input layer; processing of data is performed in hidden layer. Hidden layer transforms input data by applying weight, biases and activation function that enables the network to learn complex and non-linear data. ***Figure 1.4*** depicts the structure of Deep Learning Network

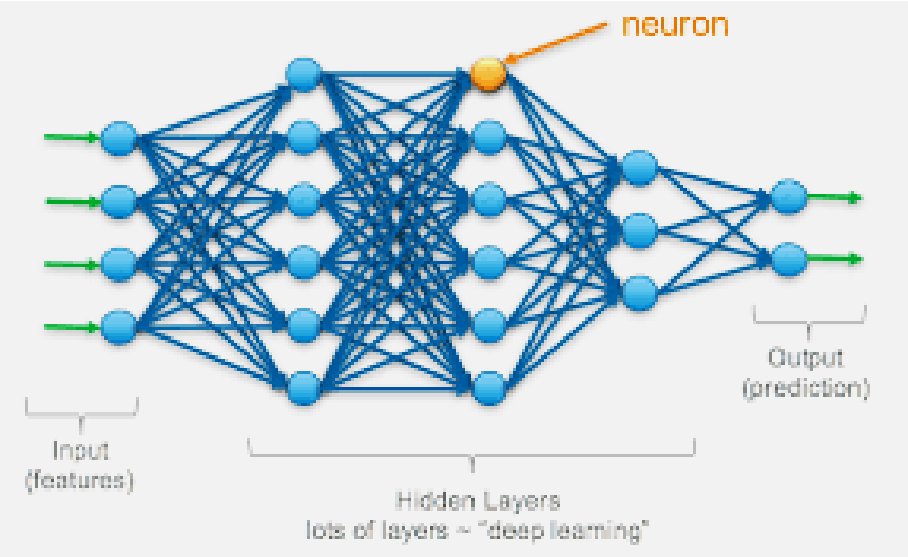

Figure 1.4 Structure of Deep Learning Network

1.6 INTEGRATING AUGMENTED REALITY AND DEEP LEARNING

Augmented reality (AR) has been hailed as a technology that perhaps has the best potential to bring digital information onto the real world. Annually, developers are introducing deep learning as an even more potent tool for AI-based procedural analyses. Where those two forces meet there seems to be an ability to open up a paradigm shift in

traditional forms of learning tend to be unproductive in capturing the learner's attention as well as in meeting their needs. This task is developed because of the necessity to design an innovative, entertaining and productive learning environment with the help of contemporary technologies like Augmented Reality (AR) and deep learning. By using such approaches as AR-based micro-lessons as well as the further improvement of object-tracking technology, the emerging learning factory for technical education will also increase the effectiveness of remote participation and professional skill development. In the same respect, implementing visual SLAM and deep learning in AR environments can enhance the features of object recognition, decrease response time, and enhance precision, even though the AR apps' practicality and benefit derived from such practical utilization are still perceived in many fields like education, auto-mobile, and virtual reality as mostly beneficial in theory.

1.9 OBJECTIVES

- To develop and evaluate an Augmented Reality framework that enhances learning and interaction in real-world environment.
- To incorporate real-time lighting estimation and adaptation techniques for improving the visual realism.
- To develop a robust AR system using Visual SLAM to enhance real-time object detection and registration in dynamic environment.
- To implement client server partitioning approach to enable efficiency, low-latency, with optimized resource management.

1.10 RESEARCH CONTRIBUTION

This study benefits the field of AR and educational technologies by introducing a new AR learning factory for technical education with micro lessons for improving distant learning and professional development. Thus, with the help of designing and applying the didactic system based on augmented reality, the improvement of the learners' interest and the increase of their compliance with the platform functionalities are shown in the study. Furthermore, the research comprehensively discusses the key computer vision problem associated with human-AR interfaces by introducing deep learning procedures for six-degrees-of-freedom dynamic object tracking to enhance the system's substantiality and stability within the closed loop tracking method. In addition, the study presents a reliable

preciseness of the applications. then it discusses the AR environments and the way to integrate AR and deep learning processes. The problem statement is discussed on the accurate AR systems in education, which is influenced by the conviction that education experiences can be transformed. Targets encompass better accuracy in AR tracking and the creation of stable educational systems. Finally, the section described the research contributions and organization regarding structure and outcomes.