Chapter 12
Smart Technologies to Build Healthcare Models for Vision Impairment

Shikha Singhal
Jaypee Institute of Information Technology, India

Shubham Jain
Jaypee Institute of Information Technology, India

Megha Rathi
Jaypee Institute of Information Technology, India

Adwitiya Sinha
Jaypee Institute of Information Technology, India

ABSTRACT

Technology has broadened the perspective healthcare delivery. Computer vision is such an enhanced spectrum of scientific revolution that imparts automated intelligence to assist patients with full or partial vision difficulties. This discipline engages machine acumen with learning and mining techniques to substitute impairment with clarity in vision. This helps people suffering from visionary ailments to see the world and experience its elegance through machine intelligence. The chapter surveys the recent and smartly configured technologies for building models and related applications, which could be useful for managing health problems in case of visually challenged ones. Several intelligent systems are analyzed and highlighted that can be utilized for providing sub-optimal cure to the concerned patients who mostly confront problems in plight of accessing relevant information, thereby receiving severely limited healthcare facilities. The chapter also illustrates several methods and mechanisms that can be applied to tailor treatment strategies as per the criticality and need towards customized clinical care for vision impairment.

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INTRODUCTION

Any adaptive service or device, which increases achievement, participation or independence for a person suffering from a disability, is known as an Assistive Technology. AT can help anyone who has impaired vision (with and without additional disabilities) to improve their connection with the world and boost their confidence. It is necessary to give it a thought regarding which tools, technologies and devices will prove suitable to meet a person's unique and individual needs.

Healthcare Sector

Healthcare sector provide services like medical aid, creation and installation of medical equipments, medicines, life insurance, health policies, and aid to day to day operations of hospital management. India's one of biggest sector is healthcare in terms of income generation and job opportunities. Services provided by healthcare organization includes: hospital management, healthcare equipments, clinical tests, outsourcing, telemedicine, health tourism, e-health, and health insurance. Quality of Indian health services are upgrading day by day due to the usage of advanced medical informatics, tools, e-services. Healthcare wraps the advanced mechanism for disease diagnosis, treatment options, disease prevention, visual and other kind of impairments (Briggs & Gray, 1999). Also, healthcare sector generates massive amount of medical data including electronic health records, medical tests findings, and management reports (McLaughlin & Fitzgerald, 2001). Medical data is further utilized for detailed analysis for effective decision making. Data mining is the most widely used technique for extracting valuable information from medical data. Data mining is basically used for assisting doctors in diagnosis, treatment options, drug suggestion. Machine learning is another field which is widely used to provide effective healthcare services. Machine learning possess great potential for health science for using medical data and analyze it to find out inefficiencies and adopt best practices that enhance overall quality, care and reduce cost. Computer Vision also made substantial progress in health science. It plays vital role for creating applications for impaired patients.

Vision Impairment

Vision Impairment (VI) is the consequence of a functional loss of vision rather than the eye disorder itself. It is not necessary therefore, to define VI in terms of the catalogue of permanent conditions or chronic diseases that result in a loss of vision (Wickramasinghe, 2010; Espique, 2010). However, the impact may be described through 3 terms:

- **Low Vision:** A person can see, but not well, and full vision cannot be enabled by surgery
- **Legally Blind:** Someone lacking visual perception due to physiological or neurological factors so that they can't see well or have minimal vision e.g. they can't see at 6 meters what others can see at 60 m
- **Totally Blind:** Someone who cannot see at all (less than 20/200 vision in their better eye), and who must therefore depend on their other senses

Assistive Technologies in Healthcare

Imagine talking to an app instead of seeing your doctor when in pain or ache. Post listening to your description (symptoms), the app retrieves the most modern research it might require to examine about how