

Chapter 10

Applications of GNNs and m-Health for Disease Tracking

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ABSTRACT

The lifestyle of people across the globe has become fast and faulty, which has resulted in a highly stressful life full of anxiety and depression. People's habits have become very unhealthy, which has led to huge rise in several Non-Communicable diseases (NCDs) or lifestyle disorders like diabetes, hypertension, cardio vascular diseases, mental health issues, etc. The heart disease is still the biggest cause of mortality in the world. It is spreading at an alarming rate due to bad lifestyles, consumption of junk food, smoking, drinking, and lack of awareness and alertness. These lifestyle disorders are spreading at an alarming rate and are spreading from epidemic to a pandemic. These, besides other health consequences, have serious social and economic implications for the individual and for the country. These conditions have multiple dimensions and can be controlled and prevented if diagnosed and treated in time by improving the overall personality of an individual with the help of technology and self-management.

INTRODUCTION

The life style of people has changed drastically across the world and the people have adopted a very fast and stressful life with no balance between life and services. Their habits have become unhealthy which has caused several life style disorders like diabetes, hypertension, dyslipidemia, cardio vascular diseases and mental health issues. As per research statistics, an estimated 425 million people globally have diabetes accounting for 12% of the world's health expenditure and yet 1 in 2 persons remain undiagnosed

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and untreated. India has become the capital of diabetes and more than 30 million people are suffering from diabetes and many others are under the risk. One in every 10 individuals would be suffering from diabetics by the year 2040. Similarly, according to another statistics, nearly 17 million people die from cardiovascular disease every year, accounting for about 31% of the global deaths. The WHO has predicted that the Heart Disease will be the most silent killer of human being at least up to 2030. Diabetes or blood sugar or cardio vascular diseases, if left uncontrolled, can cause serious health problems ranging from severe damage and complications to the vital organs to the disability or even death.

Various deep learning techniques especially its recent architectures including GANs have the potential to deal with such problems in an efficient and reliable manner. Several latest deep learning techniques have already been deployed for the early and timely prediction of various chronic diseases. GNNs are one such type of deep learning techniques which can be effectively used to track and predict various kinds of chronic diseases on time. Further, these deep learning based working models can be converted into mobile apps or devices which can be integrated into mobiles or devices or smart watches etc. and can be made publicly accessible through Internet or IOT as almost everyone today possesses a mobile device and therefore everyone can be benefitted easily and everyone can take better care of his/her health. Already a number of such m-Health technologies have been approved by FDA. So, m-Health technologies can be used to implement GNNs in fast and effective manner. This study also aims to discuss how m-health technologies using GNNs can improve the prediction, diagnosis and effective self-management of chronic diseases especially in high risk patients and those suffering from infections and in worst conditions and pandemics like Covid-19.

Although there are several standalone apps, systems and devices developed for the self-management but all of these suffer from certain limitations as all of these work on only one or few aspects and factors. The goal of this study is to design and develop holistic devices for continuous real time monitoring of individuals for self-management to control chronic diseases like diabetes, cardio vascular diseases etc. This will not only help to identify and predict early if a normal person is at risk of developing a lifestyle disorder like diabetes, Cardio Vascular disease but will also help the patients to avoid any critical condition in the future by suggesting and recommending suitable actions in the form of reminders, notifications, SMS alerts etc.

BACKGROUND

According to US Food & Drug Administration (FDA), the delivery of health services and improvement in health outcomes via mobile and wireless devices is m-Health. m-Health interventions include AIDS, i.e., smartphone applications/apps, intelligent wearable technologies, devices and systems/services like Short Message Service (SMS). The subset of digital health or electronic health (e-Health) in which health information technology, telemedicine and personalized medicine are also included is m-health is as shown in Figure 1.

Digital Health Information Technology (HIT) is the future now owing to its adaptability to changed medical guidelines and translatability across different conditions. Further, e-Health is also quickly scalable to reach thousands of people and has tremendous potential to increased access to health care. Also, the major impact of Corona Virus pandemic of 2019 has made mobile and remote technologies indispensable for life. Life services have become dependent on technology which can provide better and

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