Chapter 24
Quantum Computing Based Technique for Cancer Disease Detection System

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ABSTRACT

Barring any cancer prevention breakthroughs, the expansion of the aged population will likely increase number of older individuals diagnosed for cancer in the coming decades. Dimensions of the cancer burden and its devastating manner of challenge ahead are inferred in the context of with aging populations to underscore the possible increase that demographic factors may have on the magnitude of the cancer problem for older persons in the future years. Presently the detection procedure is very time consuming and not accurate, in this respect there is a need of more accurate, fast and efficient method through computing technologies. The present research work incorporates quantum computing with clustering algorithm i.e. Shor's algorithm of quantum computing with hierarchical clustering technique. Here adaptation of Shor's algorithm helps to increase accuracy, and hierarchical clustering technique helps to detect the stages of cancer.

INTRODUCTION

Data from National Cancer Institute Surveillance, Epidemiology, and End Results Program for the most recent five-year period, 1998-2002, reveal that 56% of all newly diagnosed cancer patients and 71% of cancer deaths are in the elderly age groups. Median ages of cancer patients at death for the major tumors common to both males and females, all races (lung, breast, colorectal, lymphoma, leukemia, pancreas, stomach, urinary bladder) range from 71 to 77 years. The median age for prostate cancer is 79 years; for ovarian and female breast cancer, the median age is 71 years for each tumor. These cancer statistics when cast against the demographic changes occurring in the U.S. population take on urgency and importance

for cancer treatment and care in our nation's (i.e. India's) health care system. The U.S. Census Bureau demographic projections indicate that the number of persons 65 years and older in the United States will double from the current estimate of 35 million persons to a projected 70 million by 2030. Barring any cancer prevention breakthroughs, the expansion of the aged population will likely increase the absolute number of older individuals diagnosed and treated for cancer in coming decades. The United States is not unique as an aging developed industrial nation with a high proportion of the cancer burden in the elderly. Other developed industrial countries have a potentiality for increased cancer incidence and mortality as their populations grow older by Yancik (2005). Using U.S. Bureau of Census demographic projections and current age standardized death rates per 100,000 population (from Worldwide Cancer Mortality Statistics, Cancer Mondial, WHO, and International Association for Research on Cancer) compares cancer in the elderly in Italy and the United States. Italy is demographically ranked as the oldest nation in the world. Dimensions of the cancer burden challenge ahead are inferred in the context of two countries with aging populations to underscore the possible increase that demographic factors may have on the magnitude of the cancer problem for older persons in the next 25 years by Yancik (2005). Presently the detection procedure is very time consuming and the results are not so fast, in this respect there is a need of more accurate, fast and efficient method through computing technologies. The present research work incorporates quantum computing with clustering algorithm i.e. Shor's algorithm of quantum computing with Hierarchical Clustering Technique. Here adaptation of Shor's algorithm can help to increase the efficiency in term of accuracy and Hierarchical Clustering Technique helps to detect the stages of cancer.

CANCER DISEASE

Term Cancer denotes malignant neoplasm, characterized as class of diseases involving uncontrolled cell growth. Lloyd (2012) found that it can harm the human body due to spread (movement) of damage cells in different parts of body with the help of blood stream. Human beings are affected by about 200 different types of known cancers. The cancer is not easy to define as a result the cells grow uncontrollable. Anand et al. (2008) produced that the cancer causes are diverse, various, tough, and only half understood till date. There are many reasons which are responsible for cancer like use of tobacco, alcohol, user diet, some infections, radiation, poor physical activity, lifestyle and environmental pollutants. Vogelstein and Kinzler (2002) worked that source can injured or combine genes along with present genes due to which cells undergoes cancerous mutations. Near about 5–10% cancers find directly for inherited genetic defects. The detection of Cancer disease can be done by numerous ways like presence of some signs and symptoms, screen testing, microscopic examination of a collected tissue sample. There are many possibilities for survival of this disease by its type and the location where the cancer is situated.

Cancer symptoms are quite varied in many manners and basically depend on where the cancer is located, where it has spread, and how large the tumor is. Some of the cancers can be felt or seen through the skin – as a lump on the breast can be an indicator of cancer in those particular locations. As cancer cells use the body's own energy and interfere with normal hormonal function, it is possible to present various symptoms such as fever, fatigue, excessive sweating, anemia, and unexplained weight loss. However, those symptoms are so common in several other maladies as well. For example, coughing hoarseness can point to lung or throat cancer as well as several other conditions. Kenneth (2013) showed that Metastasis symptoms ultimately depend on the location of diseased tissues to which the cancer has

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