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A Detailed Study on Non-Small Cancer Cell Detection and Treatment Using Data Mining Techniques

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ABSTRACT

In this paper analyse the data mining technologies how to use in health care applications. Today in the world faces lot of diseases affected by the human body. Doctors to check and analyse the human body which are all syndromes are available and the patient difficulties to make decision about the affected disease. Specialist deeply identify the syndromes and prescribed medicine and counseling to the patients. In this paper discussed some most probable diseases commonly seen to the people. First to prepare efficient database about disease and their syndromes, which are all the stages of that particular disease? How to prevent the patient from that disease. Secondly medicine specialist also creates a prescribed medicine database related to that particular disease. Thirdly expert dietician to create a excellent diet system for that particular patient. Fourth the physiotherapist prepares a regular exercise schedule for a patient for example patient prepare yoga, meditation etc. Finally the technologies and trends to monitoring the patient continuously these are all monitoring the patient's blood pressure level, sugar and insulin level, heart beat speed, eye colour monitoring etc.,. This method is really efficient and applicable for long duration curable and maintainable diseases. Data mining and data mining technologies to create and maintain large data repositories. Supervised learning algorithms to find the exact stage of the disease and provide a prescribed medical advice and counseling to the students using natural language processing with audio output.

KEYWORDS: Supervised learning, unsupervised learning, artificial intelligence in health care applications, clinical decision support system, electronic health records, DAI, OPAI, data classification algorithms.

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I. INTRODUCTION

In the health care industry to achieve a milestone in various diseases domains. Doctors do not provide medical advice and minute checkups to all the patients at every day. To establish a health care network from the hospital to the patient's home. Computers regularly and accurately monitoring the patient's health and generating simultaneous records to submitted to the medical expert system.[1] The doctors and specialist analyze the medical expert system to recommended prescribed medicine to the system. The home care patients to get the prescribed medicine and counseling through the computer.

This system also has the ability to make location aware decision continuously monitoring the patient's health. In medical database contains lot of images, doctor's suggestions, stages images of a particular disease, and prescribed medicine for a particular disease, food habit, and physiotherapy exercises.

In this paper described common technologies and algorithms offered in healthcare applications. Radiology: Large amount of imaging data analyzed by the radiologist. The medical expert system comparing the disease analysis image (DAI) to the original patient organs image (OPAI) to generate reports through the help of medical repository databases.[2] The reports to get the approval of specialist and doctors then prescribed to the patients.

For example the system analyze the lung cancer stages through the help of images. Generally the lung cancer is identified by the TNM techniques. The first identify the root cancer cell and their size. Second to analyse the cancer cells present or absent in the sputum in this test only taken the patient is affected by cold feverish and headache.[5] Third the cancer cells present are absent in the lymph liquid of the body. Finally the cancer cells are spread in the patient's body or not. This stage is final called metastasis.

II. LUNG CANCER

i. Non small cell lung cancer stage -1: Cancer cells are not identified in the parts of the ears, nose, throat but the cancer cells only found in sputum. This stage also called -1 stage. This lung cancer is identified by the bronchoscope images of nose. This comparison to be conducted using image processing technologies the white light image compared with the auto fluorescence related image with the use of any pattern matching algorithms or other cluster groping algorithms.[6 7 8]

ii. Non small cell lung cancer stage 0: In this stage cancer cells are identified in lungs but very small in size. In this stage is earlier stage, the cancer cells are not spread in outside and parts of the lungs. This stage is also called as carcinoma stage.[9]

iii. Non small cell lung cancer stage 1: Cancer cells are identified by the layers of lung tissues. This stage is a deep learning analysis check is required to the patient otherwise the cancer cells are not identified. In this stage cancer cells are not spread in the lymph liquid.[10 11]

iv. Non small cell lung cancer stage 2: In this stage cancer cells are identified in lymph liquid mainly identified to the backbone part of the patient's body.

v. Non Small cell cancer stage 3: This stage cancer cells are identified in part of the chest surfaces.

vi. Non Small cell cancer stage 4: Cancer cells are spread to lungs, ears, nose and throat.[12 20]

vii. Non Small cell cancer stage 5: Cancer cells totally spread to the human body. Such as heart, central nervous system, heart and finally spread to the brain. This is metastasis stage.[18]

These seven stages of the lung cancer images are stored in the lung cancer database. The patient to take regular tests like endoscopy the medical expert system compared the real time patient organs image(OPAI) to medical repository and make to create a report and send to the doctors system to make a decision.[16 17]

Each and every level of non small cell cancer stages images are captured in images.[13] In this images acquired in various noise reduction image processing algorithms.[15]

This image pixels can be segmented using various color filtering and colour segmentation process. The patient organ image is partitioned in to various portions. Varying the colour levels are calculated in individual color percentage.

This percentage levels can be segregated into affected portions, spread portions and non affected portions of the organ.

These color percentage levels efficiently compared into patient image dataset records, such as NCD. This process using various data classification algorithms such as ID3, linear classifier, naïve bayes, decision tree algorithms and so on.[3]

The system prepare a patient dataset record depends upon the patient health condition. This report automatically sends to the doctor's computer. The specialist analyse the machine generated health record to provide suggestion and changes to that report. Once the report is finalised the medical expert system connect the report to the medicine database to the prescribed medicine for that stage of the lung cancer. Once again the medicine get the confirmation from the specialist. The medical expert system also connected with dietician server, and physiotherapy exercise server.[5]

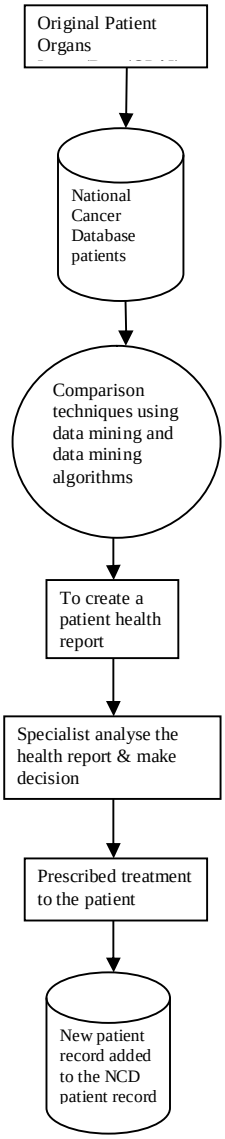

Fig 1.1Proposed system architecture

III. PROCESS INVOLVED IN NON-SMALL CANCER CELL DETECTION

First the patient to take detailed tests in hospital using efficient test methodologies machines like endoscope, laparoscope tests accurately. All tests could be conducted in zero percentage error detection level. These are all the process approved by national medical board such as Indian medical association.

Fetch the original image of the patient organ. Then applying the any image noise reduction algorithm to remove the noise of the patient organ image.

Fig1.2 Bronchoscope image of Lung Cancer

Fig1.3 White Light Image of lung Cancer

Different Algorithms used in classification of patient databases

National Cancer Database (NCDB) has one million patient's records. Yearly 1.5 million people affected by lung cancer.[9] Using data classification algorithm such as ID3 algorithm uses to make a decision tree about the stage of the non small cell lung cancer databases. This method is used to classify the stages of lung cancer. For example smoker non smoker carcinoma justification provide by this algorithm. This algorithm to take patient function parameters such as age, weight, hight, sex, climate and weather changes, tobacco habit, smoking habit all factors are analyzed to produce the a accurate results to the system. [11]

Function Parameter	Data Type
Patient Id	Numeric
Name	Character
Age	Numeric
Height	Float
Weight	Float
Diabetes	Float
Blood pressure level	Float
Sex	Character
Tobacco	Character
Smoking	Character
Alcohol	Character

Fig1.5: Patient database function parameters.

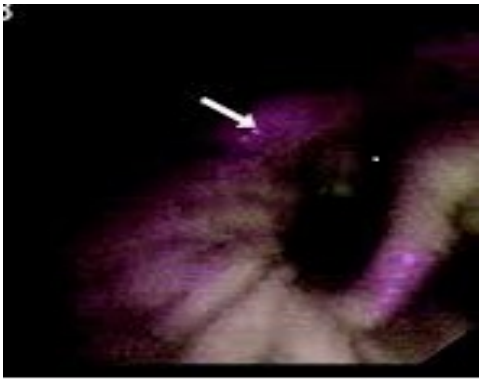

Fig1.4 Auto florescence image of lung cancer

These function parameters can be classified in to normal human being health factors varying factors should be monitoring at the time of generating OPAI.

IV. IMAGE ACQUISITION COMPARED INTO LAB TEST REPORTS WITH THE HELP OF STAGE ANALYSIS

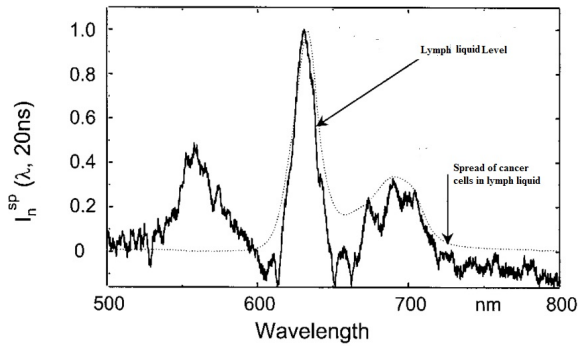

Fig1.6: Lymph liquid report of non small cancer cell detection.

Image acquisition results compared to stage analysis images. The medical expert system to find the exact stage of non-small cell cancer. In this justification to move to the next step which type of lab tests the patient should be required.[14] In this above graph the patient take a lymph liquid test in that test how long the cancer cells spread in the patient body.

V. TREATMENT AN D SURVIVAL OF PATIENT

A thoracic surgery: A doctor removes the affected part of the tissues in lung with the help of surgery. The surgery will be remove the tissues in 3 inch depth. After the surgery the patient feel painful in about two weeks.[7] This type of method is called thoracotomy, this includes various levels such as tumor, nodule, mass, wedge resection, lobectomy, pneumonectomy. This system compares the OPAI with NCDB to find the appropriate suggestion about patient health.

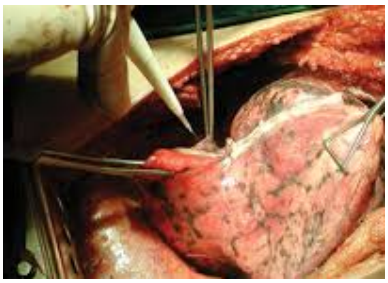

Fig1.7Thoracic surgery

i. **Radiation Therapy:** This radiation therapy could be classified in to external beam radiation therapy and internal radiation therapy.

External beam radiation therapy further classified in to 3D-conformal radiation therapy and intensity modulated radiation therapy. In 3D-conformal radiation therapy computers find the exact cancer cell location and radiation send the all directions to the tumor. On the other hand intensity modulated radiation therapy the cancer cells targeted by the radiation way at various angles and different speed.[12]

a. **Stereotactic body radiation therapy:** In this radiation method radiation send as a month or few weeks depends upon the cancer cells spread. [19]

b. **Stereotactic radio surgery:** This method is alternative for surgery. Only one time to take a Stereotactic radio surgery for patient. The cancer cells visualized to the computer and aimed at various angles the radiation will be send.[18]

iii Internal radiation therapy: In this technique the doctor keep the radioactive material in cancer cells. Every time the radiation travel around the tissues to be killed. But the small amount of good tissues also killed by the radioactive material. Mostly side effect will be caused on this technique. For example hair fall, skin tone changes etc.[17]

iv Medicine prescribed treatment: The doctor recommends medicine to destroy cancer cells such as chemotherapy at least 15 dosage of each day with hospital.

Fig **1.8: Radiation Therapy in 3D modeling image**

VI MODELS INVOLVED IN MEDICAL EXPERT SYSTEM

Lung cancer syndromes are not identifiable by the patient in initial stage. University of California provides the data set for Irvine Data mining Repository in non small cell cancer.[20] Data classification algorithms used in classifying the cancer cells in various stages. Such examples are ID3 and decision tree making. [13] In this method the doctors and specialist also learn with pattern matching, image classification and improve their decision making skills related to technology and patient health.[15] Input selection in this era the lab tests inputs are gathered and collected by well lab technician. Such as endoscope and laparoscope samples are collected by well knowledge technician.[14] Finally the pharmalogist to prescribed medicines for patient depends upon the medical expert system. In more knowledge with dosage and exact quantity of each and every dosage. The medical expert system a well formatted database for pharmacy.[16]

VI. CONCLUSION

Advantages: The cancer patient ratio increases day by day due to environmental changes and people fast food habits. So all the patients are couldn't care by doctors deeply and individually. Data repository techniques are efficiently used in compare patient health dataset in effective manner. Home sick patients are continuously monitored by medical expert system. Immediate response to the patient needs. Immovability patients should get the benefits for this technique.

Each and every step processing of medical expert system functionality and computations should be operated by authenticated heads. The patients those who are like well specialized in non-small cell

cancer take treatment to his or her monitoring so feel comfort.The deep learning machine accuracy in OPAI report about more or less 100 percent. So disease identification stage could worked well performed. The exact stage of the non-small cell cancer easily finds and matches with NCDBs within in a minutes. So make a treatment will be easy and quick.

Available medicine located in various geographical region so the treatment is well efficient.

Disadvantages: The patient always wearing with some type of monitoring devices such as sensors. So the patient feels uncomfortable. The patient home always needs high-speed internet connections some of the urban area patients this is not possible in now a days.

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