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THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
~~PROVISIONAL~~/COMPLETE SPECIFICATION

(*See* section 10 and rule 13)

1.TITLE OF THE INVENTION

Machine Learning Based System for Early Prediction of Cardiovascular Diseases

2. APPLICANT(S)

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3. PREAMBLE TO THE DESCRITION COMPLETE

The following specification particularly describes the invention and the manner in which it is to be performed.

4. Description:

Field of Invention:

Cardiovascular Diseases refer to abnormalities in heart and blockages in blood vessels. Deathrate around the globe was 17.9 million among which 85% of the deaths are caused by stroke and heart attack. World Health Organization (WHO) has estimated that by the year 2030, there will be about 23.6 million deaths worldwide due to cardiovascular diseases. The major cause for cardiovascular diseases is reported to be unhealthy lifestyle, improper diet, physical inactivity and increase in alcohol consumption. Since cardiovascular diseases are major cause of death, efficient mechanisms need to be devised for early prediction of diseases, thereby saving peoples life. Disclosed is a Machine Learning Based System for Early Prediction of Cardiovascular Diseases. Clinical and UCI datasets are pre-processed. Preprocessing is carried out for replacing missing values, label encoding, providing random over sampling for non-balanced dataset, feature scaling, normalization and data partitioning. Chi-Squared Automatic Interaction Detection, Decision Tree and Random Forest Algorithms are applied on the electronic medical records dataset to generate Prediction Model. Feature Extraction is carried out using Principal Component Analysis. Efficient Prediction Model is constructed based on Support Vector Machines and Adaboost algorithms. Model is tuned using Deep Neural Networks for accurate prediction of presence of cardiovascular diseases.

Background Art & Description:

JP2022519979A discloses an automated workflow performed by software running on at least one processor involves receiving multiple echocardiographic images taken by an ultrasound device. The first filter separates a plurality of echocardiographic images by 2D image and Doppler modality image based on the step of analyzing the image metadata. The first neural network classifies 2D images by visual image type, and the second neural network classifies Doppler modality images by visual image type. The third neural network segments the ventricles in the 2D image, the fourth neural network segments the Doppler modality image, generates a waveform trace, and the segmented 2D image and the segmented Doppler modality image.

US8525673B2 discloses a monitoring system includes one or more wireless nodes forming a wireless mesh network; a user activity sensor including a wireless mesh transceiver adapted to communicate with the one or more wireless nodes using the wireless mesh network; and a digital monitoring agent coupled to the wireless transceiver through the wireless mesh network to request assistance from a third party based on the user activity sensor.

US9107586B2 mobile system for a user includes a telephone having one or more sensors to capture fitness data or vital sign data, the telephone having a wireless transceiver coupled to the processor to communicate fitness or vital sign data over a personal area network; and a processor coupled to the personal area network to process the fitness or vital sign data.

CN109844868A kind of for use eye fundus image handling machine learning model processing eye fundus image method, system and equipment, the method, system and equipment include the computer program encoded in computer storage medium.One in the method includes: to obtain the mode input including one or more eye fundus images, and each eye fundus image is the image on the eyeground of the eyes of patient；The mode input is handled using eye fundus image handling machine learning model, wherein the eye fundus image handling machine learning model is configured to handle the mode input including one or more of eye fundus images, to generate model output；And the processing model output is to generate health analysis data.

US11126635B2 Systems, methods, and devices for a cyberphysical (IoT) software application development platform based upon a model driven architecture and derivative IoT SaaS applications are disclosed herein. The system may include concentrators to receive and forward time-series data from sensors or smart devices. The system may include message decoders to receive messages comprising the time-series data and storing the messages on message queues. The system may include a persistence component to store the time-series data in a key-value store and store the relational data in a relational database. The system may include a data services component to implement a type layer over data stores. The system may also include a processing component to access and process data in the data stores via the type layer, the processing component comprising a batch processing component and an iterative processing component.

US10978176B2 Systems, methods and apparatuses are described herein that employ machine learning techniques to assess a likelihood or risk that one or more patients will experience an adverse outcome, such as a decline in renal function, within one or more timeframes. The embodiments may utilize patient data relating to demographics, vital signs, diagnoses, procedures, diagnostic tests, biomarker assays, genetic tests, behaviors, and/or patient symptoms, to determine risk information, such as important predictive features and patient risk scores. And the embodiments may automatically execute patient workflows, such as providing treatment recommendations to providers and/or patients, based on determined risk scores.

ES2914787T3 A method of distinguishing states of a complex biological sample from a subject using a plurality of particles, the method comprising: (a) exposing the complex biological sample to the plurality of particles to allow binding of a plurality of proteins of the complex biological sample to the surfaces of the plurality of particles to form distinct biomolecule corona signatures, wherein the plurality of particles have surfaces with different physicochemical properties, and wherein a binding pattern of the plurality of proteins among the plurality of particles differs based on the physicochemical properties of the surfaces of the plurality of particles; (b) defining a representative biomolecule fingerprint of a combination of biomolecule corona signatures by separating and identifying at least a subset of proteins from the plurality of particles; and (c) associating the imprint of the biomolecule with a biological state of the subject.

US20210327062A1 invention relates to a method of assisting in diagnosis of a target heart disease using a retinal image, the method including: obtaining a target retinal image which is obtained by imaging a retina of a testee; on the basis of the target retinal image, obtaining heart disease diagnosis assistance information of the testee according to the target retinal image, via a heart disease diagnosis assistance neural network model which obtains diagnosis assistance information that is used for diagnosis of the target heart disease according to the retinal image; and outputting the heart disease diagnosis assistance information of the testee.

US20180253840A1 mirror system includes a visual display disposed to convey information and images during an active period; and the visual display disposed to provide a reflected image during an inactive period; a learning machine receiving data from one or more cameras; and a processor coupled to the visual display, the learning machine, and the camera.

US20210233656A1 A method includes capturing continuously vital signs and motion data from one or more sensors adapted to be coupled to a user; capturing food consumption of the user; predicting a predetermined health condition of the user based on the vital signs; generating a plan for the predetermined health condition; and prompting the user to execute the plan with a closed-loop feedback based on sensor data.

US20170249434A1 Real-time and individualized disease monitoring is central to rapidly evolving medical sciences and technologies, but for the vast majority of patients, disease progression and treatment are monitored only in an irregular and discontinuous fashion. Consequently, disease progression and relapse are often allowed to proceed too far before they are detected, compromising the possibility of any effective treatment. For one patient, this can mean becoming refractory to the few early drug treatments that are available; for another,

missing early detection may be deadly. This invention provides a method for the detection of early signals of disease and recovery thereof comprising a universal yet personalized health-monitoring solution using cell phones or other wearable smart device data that generate extensive real-time data. The invention further provides a system and method to provide answers to a variety of questions related to the patient health status and health trajectory. Its flexibility and generality is designed for a preferred application to rare disorders and rare questions for which other analytical system are lacking.

US11404145B2 Systems, apparatus, instructions, and methods for medical machine time-series event data processing are disclosed. An example time series event data processing apparatus includes memory storing instructions and one-dimensional time series healthcare-related data; and at least one processor. The example at least one processor is to: execute artificial intelligence model(s) trained on aggregated time series data to at least one of a) predict a future medical machine event, b) detect a medical machine event, or c) classify the medical machine event using the one-dimensional time series healthcare-related data; when the artificial intelligence model(s) are executed to predict the future medical machine event, output an alert related to the predicted future medical machine event to trigger a next action; and when the artificial intelligence model(s) are executed to detect and/or classify the medical machine event, label the medical machine event and output the labeled event to trigger the next action.

US20190087529A1 invention presents a framework for applying artificial intelligence to aid with product design, mission or retail planning. The invention outlines a novel approach for applying predictive analytics to the training of a system model for product design, assimilates the definition of meta-data for design containers to that of labels for books in a library, and represents customers, requirements, components and assemblies in the form of database objects with relational dependence. Design information can be harvested, for the purpose of improving decision fidelity for new designs, by providing such database representation of the design content. Further, a retrieval model, that operates on the archived design containers, and yields results that are likely to satisfy user queries, is presented. This model, which is based on latent semantic analysis, predicts the degree of relevance between accessible design information and a query, and presents the most relevant previous design information to the user.

US20190108912A1 invention provides methods that use machine learning to discover within clinical data patterns that are predictive of disease. Clinical data from across a population is provided as input to a machine learning system. The autonomous machine learning system

discovers associations in data from a plurality of data sources obtained from a population and correlates the associations to health status of patients in the population. The methods may further include providing patient data from an individual; and predicting, by the machine learning system, a health state for the individual when the patient data presents one or more of the discovered associations.

Cardiovascular Diseases refer to abnormalities in heart and blockages in blood vessels. Deathrate around the globe was 17.9 million among which 85% of the deaths are caused by stroke and heart attack. World Health Organization (WHO) has estimated that by the year 2030, there will be about 23.6 million deaths worldwide due to cardiovascular diseases. The major cause for cardiovascular diseases is reported to be unhealthy lifestyle, improper diet, physical inactivity and increase in alcohol consumption. Since cardiovascular diseases are major cause of death, efficient mechanisms need to be devised for early prediction of diseases, thereby saving peoples life. Disclosed is a Machine Learning Based System for Early Prediction of Cardiovascular Diseases. Clinical and UCI datasets are pre-processed. Preprocessing is carried out for replacing missing values, label encoding, providing random over sampling for non-balanced dataset, feature scaling, normalization and data partitioning. Chi-Squared Automatic Interaction Detection, Decision Tree and Random Forest Algorithms are applied on the electronic medical records dataset to generate Prediction Model. Feature Extraction is carried out using Principal Component Analysis. Efficient Prediction Model is constructed based on Support Vector Machines and Adaboost algorithms. Model is tuned using Deep Neural Networks for accurate prediction of presence of cardiovascular diseases.

Claims:

In this invention on Machine Learning Based System for Early Prediction of Cardiovascular Diseases, we claim that

1. Disclosed is a Machine Learning Based System for Early Prediction of Cardiovascular Diseases. Clinical and UCI datasets are pre-processed. Preprocessing is carried out for replacing missing values, label encoding, providing random over sampling for non-balanced dataset, feature scaling, normalization and data partitioning.
2. **As a system in Claim 1,** Chi-Squared Automatic Interaction Detection, Decision Tree and Random Forest Algorithms are applied on the electronic medical records dataset to generate Prediction Model. Feature Extraction is carried out using Principal Component Analysis.

3. **As a system in Claim** 2**,** Efficient Prediction Model is constructed based on Support Vector Machines and Adaboost algorithms. Model is tuned using Deep Neural Networks for accurate prediction of presence of cardiovascular diseases.

Description of Drawings:

For the detailed understanding of the invention the explanations with reference to the figures are given below.

Figure 1: represents the block diagram of the proposed system

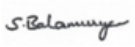
Figure 2: represents a working of the proposed system

5. Claims:

In this invention on **Machine Learning Based System for Early Prediction of Cardiovascular Diseases**, we claim that

1. Disclosed is a Machine Learning Based System for Early Prediction of Cardiovascular Diseases. Clinical and UCI datasets are pre-processed. Preprocessing is carried out for replacing missing values, label encoding, providing random over sampling for non-balanced dataset, feature scaling, normalization and data partitioning.
2. As a system in Claim 1, Chi-Squared Automatic Interaction Detection, Decision Tree and Random Forest Algorithms are applied on the electronic medical records dataset to generate Prediction Model. Feature Extraction is carried out using Principal Component Analysis.
3. As a system in Claim 2, Efficient Prediction Model is constructed based on Support Vector Machines and Adaboost algorithms. Model is tuned using Deep Neural Networks for accurate prediction of presence of cardiovascular diseases.

Dated this……. day of……. 2023

1.Signature :-  2.Signature :-  3.Signature:- 

Name: Dr.S.Balamurugan Name: Kiran Surya Sekhara Reddy Name : Dr.Bharati Wukkadada

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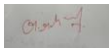
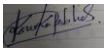
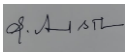
7.Signature :-  8.Signature :  9.Signature:- 

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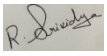
10.Signature :-  11.Signature :  12.Signature:- 

Name: E.HimaBindu Name : C.R.Srinivasan Name : Dr.Srividya R

Figure 1:

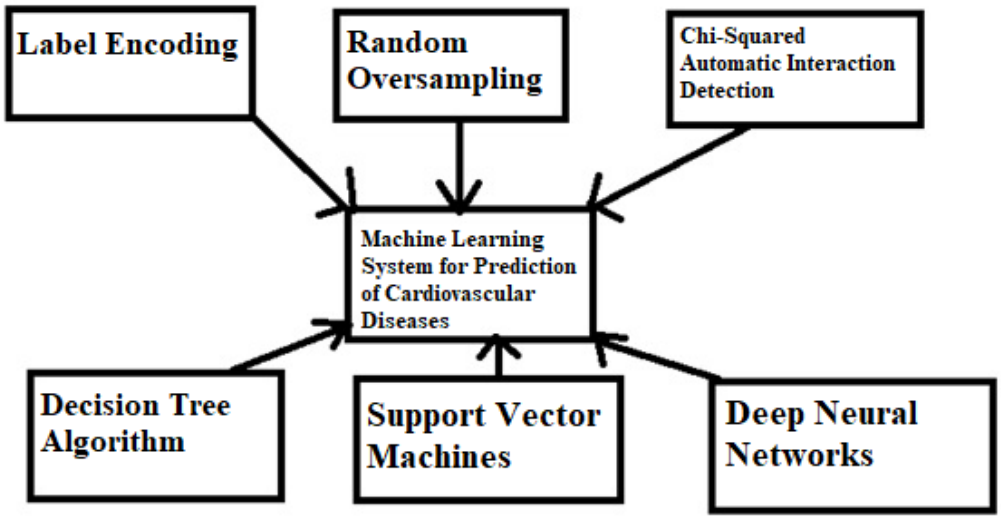


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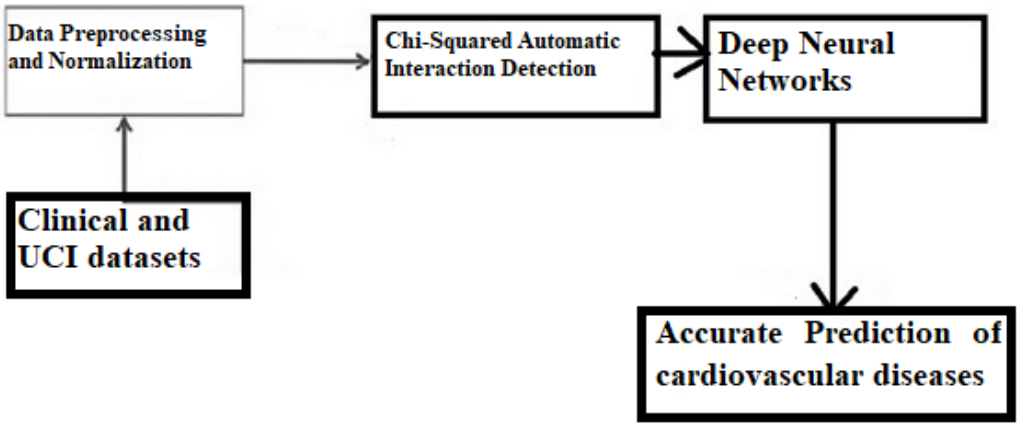
Figure 2:



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07. Abstract:

Cardiovascular Diseases refer to abnormalities in heart and blockages in blood vessels. Deathrate around the globe was 17.9 million among which 85% of the deaths are caused by stroke and heart attack. World Health Organization (WHO) has estimated that by the year 2030, there will be about 23.6 million deaths worldwide due to cardiovascular diseases. The major cause for cardiovascular diseases is reported to be unhealthy lifestyle, improper diet, physical inactivity and increase in alcohol consumption. Since cardiovascular diseases are major cause of death, efficient mechanisms need to be devised for early prediction of diseases, thereby saving peoples life. Disclosed is a Machine Learning Based System for Early Prediction of Cardiovascular Diseases. Clinical and UCI datasets are pre-processed. Preprocessing is carried out for replacing missing values, label encoding, providing random over sampling for non-balanced dataset, feature scaling, normalization and data partitioning. Chi-Squared Automatic Interaction Detection, Decision Tree and Random Forest Algorithms are applied on the electronic medical records dataset to generate Prediction Model. Feature Extraction is carried out using Principal Component Analysis. Efficient Prediction Model is constructed based on Support Vector Machines and Adaboost algorithms. Model is tuned using Deep Neural Networks for accurate prediction of presence of cardiovascular diseases.

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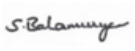
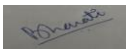
1.Signature :-  2.Signature :-  3.Signature:- 

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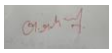
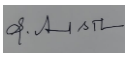
7.Signature :-  8.Signature :  9.Signature:- 

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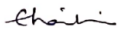
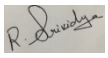
10.Signature :-  11.Signature :  12.Signature:- 

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