

# Identify Heart Diseases Using Data Mining Techniques: an Overview

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**Abstract**— Heart infection is an alternately cause of horribleness also, mortality in modern society. Restorative finding is extremely essential but confounded undertaking that should be performed precisely also, efficiently. Although noteworthy progress has been made in the finding also, treatment of heart disease, further investigation is still needed. The capacity of colossal amounts of restorative Information leads to the need alternately powerful Information examination instruments to remove helpful knowledge. There is a colossal Information capable within the healthcare systems. However, there is a undertaking of powerful examination instruments to find hidden connections also, patterns in data. Information revelation also, Information mining have found various application in business also, exploratory domain. Researchers have long been concerned with applying factual also, Information mining instruments to improve Information examination on substantial Information sets. Infection finding is one of the applications where Information mining instruments are proving successful results. This relook paper proposed to find out the heart maladies unpleasant Information mining, Support alternately Machine (SVM), Hereditary Algorithm, unpleasant set theory, affiliation rules also, Neural Networks. In this study, we briefly examined that out of the above routines Choice tree also, SVM is most powerful alternately the heart disease. So it is observed that, the Information mining could help in the identification alternately the expectation of high alternately low hazard heart diseases.

**Keywords**— Information Mining, Heart Disease, SVM, Unpleasant Sets Techniques, Affiliation Rules & Clustering

## I. INTRODUCTION

### 1.1 Overview of Information Mining

Information revelation in databases is well-characterized process consisting of several particular steps. Information mining is the core step, which results in the revelation of hidden but helpful Information from huge databases.

A formal definition of Information revelation in databases is given as follows: Information mining is the non-trivial extraction of implicit already obscure also, potentially helpful Information about data. Information mining innovation gives a user-oriented approach to novel also, hidden designs in the data. The found Information can be utilized by the healthcare administrators to improve the quality of service. The found Information can too be utilized by the restorative practitioners to diminish the number of adverse drug effect, to propose less expensive therapeutically equivalent alternatives. Anticipating patient's future behaviour on the given history is one of the essential applications of Information mining routines that can be utilized in wellbeing care management.

A alternately challenge facing healthcare associations (hospitals, restorative centers) is the provision of quality services at afford capable costs. Quality administration implies diagnosing patients effectively also, administering treatments that are effective. alternately clinical choices can

lead to disastrous consequences which are consequently unacceptable. Hospitals must too minimize the cost of clinical tests. They can achieve these results by employing proper computer-based Information and/alternately choice support systems. Wellbeing care Information is massive. It incorporates quiet centric data, resource administration Information also, changed data. Wellbeing care associations must have capacity to analyze data. Treatment records of millions of patients can be stored also, computerized also, Information mining routines might help in answering several essential also, critical questions related to wellbeing care.

The available of integrated Information via the colossal quiet repositories, there is a shift in the perception of clinicians, patients also, payers from qualitative visualization of clinical Information by demanding a more quantitative appraisal of Information with the supporting of all clinical also, imaging data. Alternately occurrence it might presently be conceivable alternately the doctors to compare diagnostic Information of different patients with in distinguish capable conditions. Likewise, doctors can too confirm their discoveries with the conformity of other doctors dealing with an in distinguish capable case from all over the world . Restorative finding is considered as a noteworthy yet intricate undertaking that needs to be conveyed out precisely also, efficiently. The automation of the same would be highly beneficial.

Clinical choices are frequently made based on doctors' intuition also, experience rather than on the Information rich Information hidden in the database. This hone leads to undesirable biases, blunders also, excessive restorative costs which influences the quality of administration given to patients. Wu, et al proposed that integration of clinical choice support with PC based quiet records could diminish restorative errors, improve quiet safety, decrease undesirable hone variation, also, improve quiet result . This suggestion is promising as Information modelling also, examination tools, e.g., Information mining, have the potential to create a knowledge-rich environment which can help to significantly improve the quality of clinical decisions.

The advancement of Information Innovation has generated substantial sum of databases also, colossal Information in different areas. The relook in databases also, Information innovation has given rise to an approach to store also, manipulate this precious Information alternately further choice making. Information mining is a process of extraction of helpful Information also, designs from colossal data. It is too called as Information revelation process, Information mining from data, Information extraction alternately Information /design analysis. Information mining is a logical process that is utilized to look unpleasant substantial sum of Information in order to find helpful data. The goal of this strategy is to find designs that were already unknown.

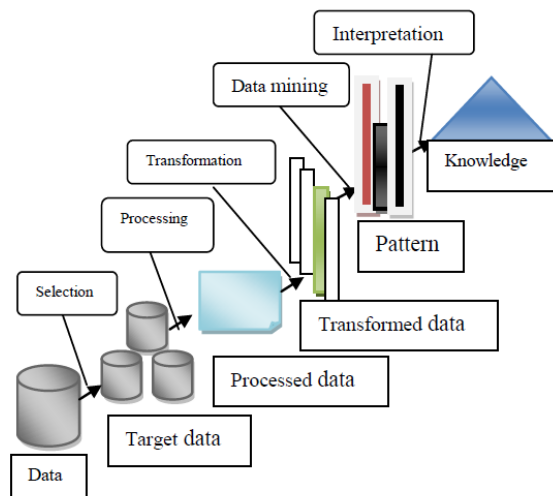


Fig. 1: KDD Process

Once these designs are found they can further be utilized to make certain choices alternately advancement of their businesses.

Three steps included are

- Investigation
- Design identification
- Arrangement

*Exploration:* In the first step of Information Investigation Information is cleaned also, changed into another form, also, essential variables also, then nature of Information based on the issue are determined.

*Design Identification:* Once Information is explored, refined also, characterized alternately the particular variables the second step is to structure design identification. Recognize also, choose the designs which make the best prediction. Deployment: Designs are deployed alternately desired outcome.

## 1.2 Employments also, Sway of Heart Diseases

According to WHO report Global atlas on cardiovascular infection prevention also, control states that cardiovascular infection (CVDs) are the driving employments of demise also, capacity in the world. Although a substantial extent of CVDs is preventable, they continue to rise principally since preventive measures are inadequate. Over 17.3 million an assessed 17.3 million individuals died from CVDs in 2008, Over 80% of CVD passings take place in low- also, middle-salary countries, 23.6 million By 2030, almost 23.6 million individuals will die from CVDs.

### 1.2.1 Protect heart wellbeing

- Tobacco use, an horrible diet, also, physical inertia increment the hazard of heart assaults also, strokes.
- Engaging in physical activity alternately at slightest 30 minutes extremely day of the week will help to forestall heart assaults also, strokes.
- Eating at slightest five servings of fruit also, vegetables a day, also, limiting your salt intake to less than one teaspoon a day, too helps to forestall heart assaults also, strokes.

### 1.2.2 Cardiovascular Maladies (CVDs) Key Facts

- CVDs are the number one cause of demise globally: more individuals die annually from CVDs than from any other cause.
- An assessed 17.3 million individuals died from CVDs in 2008, representing 30% of all global deaths. Of these deaths, an assessed 7.3 million were due to coronary heart infection also, 6.2 million were due to stroke.

- Low- also, middle-salary nations are disproportionately affected: over 80% of CVD passings take place in low- also, middle-salary nations also, occur almost equally in men also, women.
- By 2030, almost 23.6 million individuals will die from CVDs, principally from heart infection also, stroke. These are projected to remain the single driving employments of death.

### 1.2.3 Cardiovascular Diseases

Cardiovascular infection is utilized by disorders of the heart also, blood vessels, also, incorporates coronary heart infection (heart attacks), cerebrovascular infection (stroke), raised blood weight (hypertension), peripheral artery disease, rheumatic heart disease, congenital heart infection also, heart failure. The alternately employments of cardiovascular infection are tobacco use, physical inactivity, an horrible diet also, harmful use of alcohol. These are the three employments of heart maladies (1) mid-section torment (2) stroke also, (3) heart attack.

To forestall also, identification of these maladies distinctive routines of Information mining is utilized unpleasant this easily find out heart related maladies also, this is the aim of this relook studies.

Heart infection is the driving cause of demise all over the world in the past ten years. Several researchers are utilizing factual also, Information mining instruments to help wellbeing care professionals in the finding of heart disease.

## II. INFORMATION MINING CALCULATIONS AND TECHNIQUES

Different calculations also, routines like Classification, Clustering, Regression, Counterfeit Intelligence, Neural Networks, Affiliation Rules, Choice Trees, Hereditary Algorithm, Nearest alternately system etc., are utilized alternately Information revelation from databases.

### 2.1. Classification

Order is the most connected Information mining technique, which utilizes a set of pre-ordered cases to create a model that can arrange the populace of records at large. Fraud identification also, credit hazard applications are particularly well suited to this sort of analysis. This approach frequently utilizes choice tree alternately neural network-based order algorithms. The Information order process involves learning also, classification. In Learning the preparing Information are analyzed by order algorithm.

In order test Information are utilized to estimate the precision of the order rules. If the precision is acceptable the rules can be connected to the new Information tuples. Alternately a fraud identification application, this would include complete records of both fraudulent also, valid activities decided on a record-by-record basis. The classifier-preparing calculation employments these pre-ordered cases to determine the set of parameters required alternately proper discrimination. The calculation then encodes these parameters into a model called a classifier.

Sorts of order models:

- Order by choice tree actuation
- Bayesian Order
- Neural Frameworks
- Support alternately Machines (SVM)
- Order Based on Associations

### 2.2. Clustering

Gathering can be said as identification of comparative classes of objects. By utilizing gathering routines we can further recognize dense also, sparse regions in object space also, can find overall distribution design also, correlations among Information attributes. Order approach can too be utilized alternately powerful Implies of distinguishing bunches alternately classes of object but it becomes costly so gathering can be utilized as preprocessing approach alternately quality subset determination also, classification. Alternately example, to structure bunch of customers based on purchasing patterns, to categories qualities with comparative functionality.

Sorts of gathering methods

- Dividing Routines
- Hierarchical Agglomerative (divisive) routines
- Density based routines
- Grid-based routines
- Model-based routines

### 2.3. Predication

Relapse strategy can be adapted alternately predication. Relapse examination can be utilized to model the relationship between one alternately more free variables also, dependent variables. In Information mining free variables are traits already known also, reaction variables are what we want to predict. Unfortunately, various real-world issues are not simply prediction. Alternately instance, sales volumes, stock prices, also, product disappointment rates are all extremely difficult to anticipate since they might depend on complex interactions of various predict

alternately variables. Therefore, more complex routines (e.g., logistic regression, choice trees, and alternately neural nets) might be necessary to figure future values. The same model Sorts can frequently be utilized alternately both Relapse also, classification. Alternately example, the CART (Order also, Relapse Trees) choice tree calculation can be utilized to build both order trees (to arrange downright reaction variables) also, Relapse trees (to figure constant reaction variables). Neural frameworks too can create both order also, Relapse models.

Sorts of Relapse methods

- Straight Relapse
- Multivariate Straight Relapse
- NonStraight Relapse
- Multivariate NonStraight Relapse

#### 2.4. Affiliation principle

Affiliation also, correlation is usually to find frequent thing set discoveries among substantial Information sets. This sort of finding helps associations to make certain decisions, such as catalogue design, cross marketing also, customer shopping behavioralternately analysis. Affiliation Principle calculations need to be capable to create rules with certainty values less than one. However the number of conceivable Affiliation Rules falternately a given dataset is generally extremely substantial also, a high extent of the rules are usually of little (if any) value.

Sorts of affiliation rule

- Multilevel affiliation principle
- Multidimensional affiliation principle
- Quantitative affiliation principle

#### 2.5. Neural frameworks

Neural system is a set of connected input/output units also, each connection has a weight present with it. During the learning phase, system learns by adjusting weights so as to be capable to anticipate the right class labels of the data tuples. Neural frameworks have the remarkable capacity to derive meaning from confounded alternately imprecise Information also, can be utilized to remove designs also, detect patterns that are too complex to be noticed by either humans alternately other PC techniques. These are well suited alternately constant valued inputs also, outputs. Alternately illustration handwritten character reorganization, preparing a PC to pronounce English text also, various genuine world business issues also, have already been effectively connected in various industries.

Shaikh Abdul Hannan et.al describes aiming to create a master framework diagnosing of heart infection utilizing support alternately machine also, feed-forward back-propagation technique. Presently a days neural system are being utilized effectively in an expanding number of application areas. This work incorporates the detailed Information about quiet also, reprocessing was done. The Support alternately Machine (SVM) also, feed-forward Back-propagation strategy have been connected over the Information alternately the master system. .

Shen, Z., Clarke et.al present conceivable interpretations of the weights of these neurons also, show how they can be utilized as a determination criteria alternately which questions to use as inputs. The strategy is compared against other factual routines . Neural frameworks are best at distinguishing designs alternately patterns in Information also, well suited alternately expectation alternately forecasting needs.

### III. SURVEY OF WRITING (DISTINCTIVE INFORMATION MINING ROUTINES TO FIND OUT HEART DISEASES)

#### 3.1 Choice Tree Order Algorithm

Heart infection alternately coronary artery infection (CAD) alternately coronary heart infection (CHD) alternately ischemic heart infection (IHD) is a broad term that can allude to any condition that influences the heart. Alternately creating clinical choice support systems, writing presents a number of researches that have made use of counterfeit intelligence also, Information mining techniques. Till now, several ponders have been reported on heart infection diagnosis. These ponders have connected distinctive approaches to the given issue also, accomplished high order accuracies, of 77% alternately higher, utilizing the dataset taken from the UCI machine learning repository. Experimental results showed a right order precision of approximately 77% with a logistic-regression-derived discriminate function. The John Gennari LASSIT conceptual gathering framework accomplished a 78.9% precision on the Clevelalso, database. A Fuzzy Support alternately Gathering to recognize heart infection was utilized in. Resul Das presented a methodology that employments SAS base software 9.13 alternately diagnosing heart disease. Zheng Yao connected a new model called R-C4.5 which improved the efficiency of attribution determination also, dividing models. Gang Kou partition connected Information separation-based routines to preserve privacy in the order of restorative data.

Karolis M.A. et.at has created a Information mining framework alternately the appraisal of heart occasion related hazard components targeting in the lessening in the lessening of CHD occasions utilizing the hazard



components i) Before the occasion a) non modifiable – age, sex etc. The examination was conveyed out utilizing C4.5 choice tree calculation alternately the said three occasions utilizing five distinctive splitting criteria. The highest percentage of right order archived were 66%, 75% also, 75% alternately the myocardial Infarction (MI) Percutaneous Coronary Intervention (PCI) also, Coronary Artery Bypass Graft Surgery (CABG) .

CHD have reached scourge extents among Indians. India is undergoing a rapid wellbeing transition with rising load of CHD. Further, the long-term case fatality following acute coronary syndrome is considerably higher among Indians as compared to other populations. In addition, a reversal of socio-economic gradients alternately CHD hazard components has risen in the Indian population. In this work, we have recognized a framework alternately automated restorative finding of heart infection hazard utilizing choice tree classifier. The success of populace based interventions, addressing various hazard components alternately CHDs, unpleasant lifestyle linked community programmes was demonstrated initially in North Karelia study2.

In creating nations such as India such measures might indeed work due to several reasons. First, the hazard fact alternately levels are high among Indians conferring a higher risk. Interventions are likely to have a higher sway on high hazard populace . CVD are the driving cause of demise also, capacity in both created also, creating countries. A paradigm shift away from the bio-restorative model is consequently required in the perspective of the existing wellbeing care framework while responding to the rapidly expanding load of CVD horribleness also, mortality in India . Uneducated also, less educated individuals in rural India have a higher prevalence of coronary heart infection also, of the coronary hazard components smoking also, hypertension .Examination of Information propose that the hazard alternately CVD also, stroke is at scourge extents in a cohort of well-educated doctors who are in the highest quintile of salary . CVD influences individuals of all salary levels .

### 3.2. UCI Database Description about Choice Tree Classification

The heart infection database from the College of California Irvine. UCI archive is used. This database contains four Information sets from the Cleveland, Clinic Foundation, Hungarian Institute of Cardiology, V.A. Restorative Focus also, College Hospital of Switzerland. It gives 920 records in total. Originally, the database had 76 raw attributes. However, all of the published experiments just allude to 13 of these: Age, Sex, P, Trstbps, Chol, Fbs, estecg, Thalach, Exang, OldPeak, Slope, Ca, Thal also, Num.

### 3.3 Gathering D.M. Strategy Utilizing K- Implies Algorithms

The categorization of objects into different bunches alternately the dividing of Information set into subsets so that the Information in each of the subset share a general feature, frequently the proximity with regard to some characterized distance measure, is known as Clustering. The gathering issue has been recognized in various contexts also, addressed being proven advantageous in various restorative applications. Gathering the restorative Information into little with noteworthy Information can aid in the revelation of designs by supporting the extraction of various proper features from each of the bunches thereby introducing structure into the Information also, aiding the application of conventional Information mining techniques. Various routines are available in the writing alternately gathering also, employed the renowned K-implies gathering calculation in this approach. The k-implies calculation is one of the widely recognized gathering instruments that are connected in a variety of exploratory also, industrial applications. k-implies bunches the Information in accordance with their characteristic values into k particular clusters. Information categorized into the same bunch have indistinguishable highlight values. k, the positive integer indicating the number of clusters, needs to be given in advance. The steps included in a k-implies calculation are given subsequently:

Expectation of heart infection utilizing K – Implies gathering technique

1. K employments indicating the Information to be grouped are placed into the space. These employments denote the primary bunch centurions.
2. The Information are appointed to the bunch that is adjacent to the centurion.
3. The positions of all the K centroids are recalculated as soon as all the Information are assigned.
4. Steps 2 also, 3 are reiterated until the centroids stop moving any further. This results in the segregation of Information into bunches from which the metric to be minimized can be deliberated.

The pre-processed heart infection Information is grouped utilizing the KImplies calculation with the K values. Gathering is a sort of multivariate factual examination too known as bunch analysis, unsupervised order analysis, alternately numerical taxonomy. K-implies gathering generates a particular number of disjoint, flat (non-

hierarchical) clusters. It is well suited to generating globular clusters. The K-implies system is numerical, unsupervised, non-deterministic also, iterative.

### 3.4 K-implies also, derivatives

The k-implies calculation assigns each point to the bunch whose focus (too called centroid) is nearest. The focus is the average of all the employments in the bunch — that is, its coordinates are the arithmetic mean alternately each dimension separately over all the employments in the cluster. Example: The Information set has three dimensions also, the bunch has two points

$X = (x_1, x_2, x_3)$  also,  $Y = (y_1, y_2, y_3)$ . Then Z becomes  $Z = (z_1, z_2, z_3)$ , where

$z_1 = x_1 + y_1$ ,  $z_2 = x_2 + y_2$  also,  $z_3 = x_3 + y_3$

### 3.5 Advantages to utilizing this strategy

- The main advantages of this calculation are its straightforwardness also, speed which allows it to run on substantial datasets.
- With a substantial number of variables, K-implies might be computationally faster than hierarchical gathering (if K is small).
- K-implies might produce tighter bunches than hierarchical clustering, particularly if the bunches are globular.

### 3.6 Information Mining Unpleasant Hereditary Calculations

We start out with a randomly chosen first generation. Extremely string in this era is assessed according to its quality, also, a fitness esteem is assigned. Next, a new era is produced by applying the reproduction operator. Sets of strings of the new era are chosen also, hybrid is performed. With a certain probability, qualities are changed before all arrangements are assessed again. This method is rehashed until a greatest number of eras are reached. While doing this, the all time best solution is stored also, returned at the end of the algorithm.

Hereditary calculation have been utilized in , to diminish the actual Information size to get the optimal subset of attributed sufficient alternately heart infection prediction. Order is a supervised learning system to remove models describing essential Information classes alternately to anticipate future trends. Three classifiers e.g. Choice Tree, Innocent Bayes also, Order via gathering have been utilized to diagnose the vicinity of heart infection in patients. Sets of

strings of the new era are chosen also, hybrid is performed. With a certain probability, qualities are changed before all arrangements are assessed again. This method is rehashed until a greatest number of eras are reached.

### 3.7 Order via clustering

Gathering is the process of gathering comparative elements. This strategy might be utilized as a preprocessing step before feeding the Information to the classifying model. The quality values need to be normalized before gathering to avoid high esteem traits dominating the low esteem attributes. Further, order is performed based on clustering. Experiments were conducted with Weka 3.6.0 tool. Information set of 909 records with 13 attributes. All traits are made downright also, inconsistencies are resolved alternately simplicity. To improve the expectation of classifiers, Hereditary look is incorporated. Observations exhibit that the Choice Tree Information mining strategy outperforms other two Information mining routines after incorporating highlight subset determination but with high model advancement time. Innocent Bayes performs consistently before also, after lessening of traits with the same model advancement time. Order via gathering performs alternately compared to other two methods.

### 3.8 Affiliation Principle Discovery

Affiliation rules represent a promising strategy to improve heart infection prediction. Unfortunately, when affiliation rules are connected on a restorative Information set, they produce an extremely substantial number of rules. Most of such rules are medicinally immaterial also, the time required to find them can be impractical. Four limitations were proposed to diminish the number of rules: thing filtering, quality grouping, greatest thing set size, also, antecedent/consequent principle filtering. When affiliation rules are connected on a restorative Information set, they produce an extremely substantial number of rules. Most of such rules are medicinally immaterial also, the time required to find them can be impractical. A more essential issue is that, in general, affiliation rules are mined on the entire Information set without validation on an free sample. To solve these limitations, the author alternately has presented an calculation that employments look limitations to diminish the number of rules, searches alternately affiliation rules on a preparing set, also, finally validates them on an free test set. Instead of utilizing just Support also, confidence, one more parameter i.e. lift have been utilized as the metrics to evaluate the restorative significance also, capacity of affiliation rules. Restorative specialists use affectability also, specificity as two basic statistics to approve results. Affectability is characterized as the likelihood of effectively distinguishing sick patients, whereas specificity is characterized as the likelihood of

effectively distinguishing healthy individuals. Lift was utilized together with certainty to understand also, affectability also, specificity. To find prescient affiliation rules in a restorative Information set the calculation has three alternately steps. First, a restorative Information set with downright also, numeric traits is changed into a transaction Information set. Second, four limitations said above are fused into the look process to find prescient affiliation rules with medicinally relevant quality combinations. Third, a train also, test approach is utilized to approve affiliation rules.

### 3.9 Unpleasant Set Theory

The result of Information revelation process can be choice tree, affiliation rules, choice rules, sequential pattern, etc. The most comprehensive also, interpretable Information extracted is in the structure of rules. Some principle actuation calculation such as unpleasant set hypothesis results in substantial number of rules. This substantial number makes interpret capacity of the Information becomes low. Lacking of interpret capacity will cut down the advantages of principle based systems. The resulting substantial number of rules is since of noise redundancy in data and/alternately preparing Information sets. Principle pruning is the system to diminish the number of rules while maintaining the quality of the system. Unpleasant set hypothesis (RST) is a generally new numerical also, counterfeit intelligent strategy created by Zdzislaw Pawlak, Warsaw College of Technology, in the early1980. RST is particularly helpful to find connections in data. The revelation of relationship in the Information is called Information revelation alternately Information mining. The result of Information revelation is understandable also, noteworthy Information from data. RST system risen as numerical instrument to manage uncertainties, ambiguity also, vagueness from incomplete, inexact also, noisy information.

Unpleasant this strategy it discovers rules assessed with support, confidence, also, lift. Affiliation rules are connected on a genuine Information set containing restorative records of patients with heart disease.

## IV. CONCLUSION

This paper examines the order routines in Information mining also, appears the performance of order among them. In these order precision among these Information mining routines has discussed. The result appears the difference in alternately rates. However there are generally differences in

distinctive techniques. Choice tree also, SVM per-structure order more precisely than the other methods. Information mining application in heart infection name et.al. Reported that the advantage of Information mining strategy appears the 92.1 % 91.0 % precision the heart disease.

We propose that the age, sex, mid-section pain, blood pressure, personnel history, previous history, cholesterol, fasting blood sugar, resting ECG, Greatest heart rate, slope, etc. that might be utilized as reliable indicators to anticipate vicinity of heart disease. We too propose that Information should be investigated also, must be verified from the team of heart infection specialist doctors.

In future, we will try to increment the precision alternately the heart infection quiet by expanding the different parameters suggested from the specialists by utilizing distinctive Information mining techniques.

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