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A Analysis on Various Data Mining Approaches To Predict Fibroid Tumor Presence In Women

[1]Dr.M.Renuka Devi, [2]V.Sindhu
[1]Director, Department of MCA,
[2]Assistant Professor, Department of MCA,
[1,2]Sri venkateswara College of Computer Application and Management, Coimbatore.

Abstract

Computerized healthcare system is more effective in present days especially with the application of data mining concepts in massive amount medical datasets. This data mining techniques can be applied for effective mining of women healthcare. Nowadays women are widely effected with uterine fibroid. Fibroid is medically referred as leiomyoma and myoma. It is comes under the category of tumors. It is not a deadly disease. Prediction of fibroid occurrence is detected with some symptoms like heavy bleeding, miscarriage, irregular menstrual cycle, etc.,. Some patients are without these symptoms too. Healthcare is the one of the application area were the data mining tools like WEKA, RAPIDMINER, R, ORANGE, MATLAB, etc., are proving very productive results. This study focuses on availability of various fibroid detection methods using data mining techniques women integral reproductive parts.

Key Words: Uterine Fibroid, Data Mining, Tools

Introduction

Data Mining is a process of extracting an amount of data from large database. With the availability of large database in medical field, mining of these data plays a vital role. This process helps in diagnosing by making it more reliable to the analyst. The process of applying data mining techniques in medical data are very effective in decisions making, classifying, clustering and many other processes. This application helps to predict the future of the patient and their hereditary. With all this effective features of data mining in medical dataset we focus it in women healthcare i.e. Fibroid detection system. With the available extended features of computerized medical data model we apply the data mining techniques to the prediction of uterine fibroid in

women. Even though fibroid is not a life threatening disease it an issue relating to our next generation as it affects the reproductive system of women.

Fibroid as Tumor

Fibroid is major issues in women health. It is considered as a tumor (non cancerous).It develops in the inter reproductive (Uterus) of women. It is commonly called as Uterine Fibroid. Its medical Terms are myomas or fibromyomas. The fibroids commonly grow in groups. The single fibroid is called as Uterine Fibroma. Fibroids are nothing but a soft tissue. These fibroids vary in size, from a minimum to a maximum.

This fibroid affects about 20% of women in their life span. It is commonly seen in women at reproductive age from 20 to 50.The occurrence of fibroid is commonly found in the women who are overweight and obese when compared to women at normal weight.

Causes and Symptoms of Fibroid

The causes of fibroid are not very certain. It is examined that the estrogen and progestrogen levels during pregnancy and menopause are the basic causes of fibroid. Further researches are being done on this problem to identify the exact cause of fibroids. The presence of fibroid can be identified with some of its common symptoms. Some of the patients do not show any symptoms. It is very difficult to identify its presence for the patients without any symptoms. This type of fibroids very often leads to some complexities. Some of the symptoms of fibroid are listed below:

- Heavy or Long Bleeding During Menstrual Cycle
- Back Pain
- Heavy Painful Periods
- Leg Pain
- Pain during sexual contact
- Swelling in the lower abdomen
- Fertility Problems
- Repeated miscarriages

Types of Fibroid:

The fibroids can be classified into four types. All these four type of fibroids affect various parts of uterus. It may be of different sizes and can be with or without any symptoms based on its occurrences. They are classified as:

- Intramural Fibroids: These types of fibroids are found in the wall of the uterus. It is a common type of fibroid found in many women.
- Subserosal Fibroids: These are found outside of the uterus wall. They grow in stalks and are often quite large in size.
- Submucosal Fibroids: These types of fibroids are found in the muscle below the lining of the uterus wall.
- Cervical Fibroids: These are present in the neck of the uterus (womb).

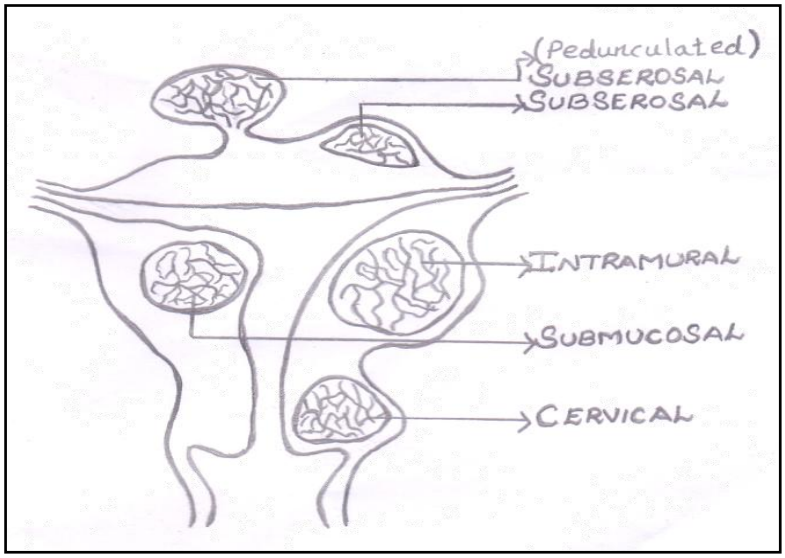

Figure 1: Types of Fibroid

Complications of Fibroid

As the fibroids are the non cancerous tumors they often do not lead to any complexities. But it is found that patients with fibroid are to come across some of its backwaters. They are categorized as:

- Menorrhagia (Heavy Periods)
- Abdominal Pains
- Premature birth
- Miscarriages
- Infertility
- Leiomyosarcoma

Application of Data mining in Fibroid:

Data mining plays a vital role in extracting the defined knowledge from the given set of large database. With the application of these extracting techniques in data mining the fibroid occurrence can be detected. The various aspects and technical approach can be very effective to diagnose the disease. This computerized approach has resulted to classify, make decisions, cluster the group of patients and to predict the chance of being effected based on the symptoms and hereditary. This has been studied and examined by different authors in their various works it has been tabulated below as:

Table 1: Survey on Various Data Mining Techniques

S. No	Tittle	Author & Year of Publication	Tools	Methods	Grading Efficiency
1	Development of Prediction system for Fibroid	Malarkodi.s , 2010	MATLAB	Feature Extraction, ANFIS, Neuro Fuzzy Classifiers	96%
2	A Computer Aided Diagnostic tool for detection of utrine fibroid	N.Sriraam et al, 2013	Gobar Wavelet	Texture Segmentation, Neural Network	95%
3	Data Mining Techniques used for Uterus fibroid Diagnosis and Prognosis	D.K.Girija et al, 2012	Tangra	Classification: C4.5,ID3,Navie Bayes	98%
4	Uterine Fibroid Segmentation & Measurement Based on Morphological Functions in graphical Vision Assistant Tool	Prabakar et al, 2012	Vision Assistant Tool	Classification	96%
5	Data Mining Approach for Prediction of Fibroid Disease using Neural Networks	D.K.Girija et al, 2013	MATLAB	Neural Networks	98%
6	A SVM Based Automated Detection of Uterine Fibroids using Gabor and Wavelet Features	N.Sriraam et al, 2012	Gabor Wavelet	Support Vector Machines as Classifiers	97.2%
7	Segmentation and Feature Extraction of Fluid Filled Fibroid- A Knowledge Based Approach	Ratha Jeyalakshmi et al , 2010	Mathematical Morphological Concepts	Feature Extraction	98%
8	Detection of Uterine Fibroid using Wavelet Packet Feature with BPNN Classifer	N.Sriraam et at, 2010	MATLAB	Neural Network, Classification	97.3%
9	Classification of Women Health Disease(Fibroid) using Decision Tree Algorithm	D.K. Girija et al, 2012	WEKA	Classification, Decision Tree	98%
10	Comparision of Fibroid Syndrome using Data Mining Techniques	D.K.Grija et al, 2012	Orange Canvas	K-Nearest Neighbour, Classification Tree, Navie Bayes	99%

Result and Discussions

Since prediction and diagnosis of a disease is a major task of treatment. The algorithmic and computerized approach to diagnose a disease especially fibroids are more effective. This survey presents a various procedural data mining approach in the women health care domain. These are the very common and new approaches to diagnose the disease using data mining techniques. This survey work also presents the recent research work carried out in the healthcare domain for women particularly in fibroid. The studied algorithms are more effective in fibroid detection. It is evaluated with its performance in percentage. It is also very hard to disclose that only particular algorithm works effectively in disease. In some cases some algorithms works for better than others, it happens with the properties like attributes, techniques, algorithm selected, tool used, etc.,. From chart 1 given below shows the performance evaluation of various data mining techniques in detection fibroid disease in women. And from the given dataset it found that the classification and neural networks are more efficient in detecting the disease.

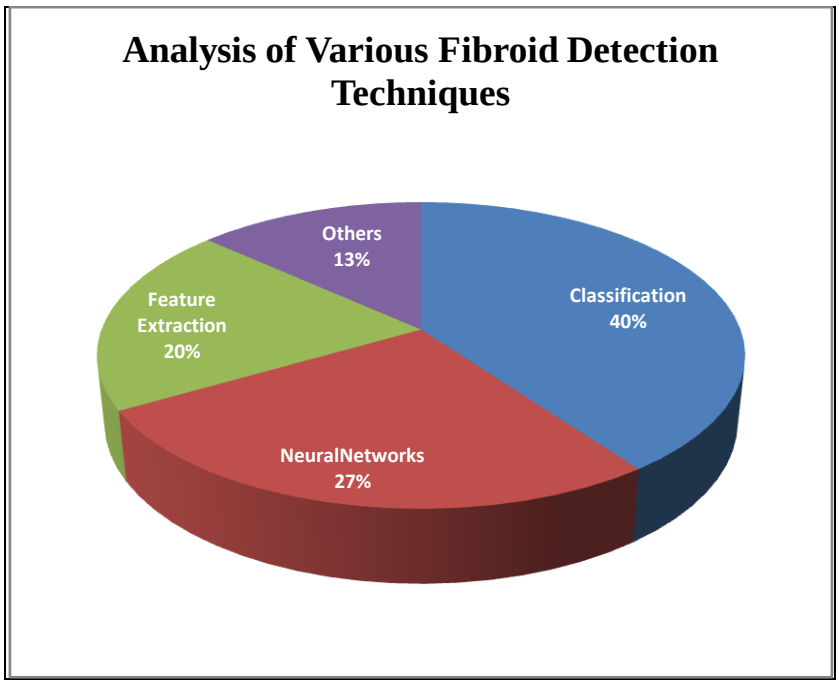

Chart 1: Fibroid Detection Methods

Data Mining Tools Performance:

Data mining along with its mining tools work very efficiently to detect the occurrence of fibroid disease in women. There are different types of data mining tools available to work on the given set of data. They are WEKA,MATLAB,TANGARA,ORANGE CANVAS,GOBAR WAVELET,R,RAPID MINER,SAS,SPSS CLAMITINE,E-MINER,ORACLE DM, etc.., These tools produce different results with their attributes. Each of these tool is comparatively better to one another at various states. The performance of these tools in detecting fibroid has been charted below in chart 2.

It is categorized based on the classifying capacity of the tool and its ability to predict the symptoms of the disease in patients. This cart discloses that MATLAB and GOBAR WAVELET tools are more fruitful in classifying the data. Other tools may also work effectively with some more features and attributes.

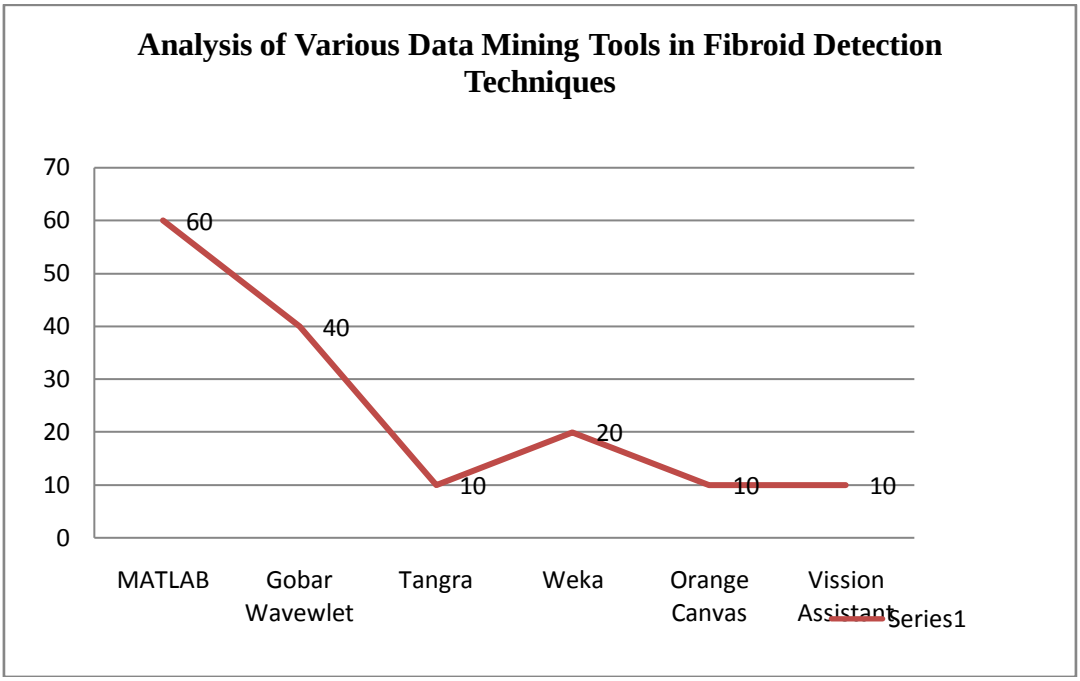

Chart 2: Data Mining Tool Analysis

Conclusion

It is concluded that further more studies has to be carried out to detect the disease in initial stage and to find the exact root cause of the disease to avoid the complications in women health during their pregnancy and menopause. It is noticed that Classification data mining technique showed more accuracy in classifying the data model in various study. MATLAB tool is used to accompany the data mining task. It is found that other techniques like neural networks are also used to detect the disease. This paper summarized the data mining techniques used for grading and also in detecting the disease. The best method for detecting the disease is K-Nearest Neighbor, Classification Tree, Navie Bayes which shows 99% in finding the disease.

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