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Study and Analysis of the Scope of Improvements in Fitness Advisor Systems using Data Mining

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Abstract: There are a lot of health related problems today that have a direct or an indirect connection to the respective person's body weight. Efficient diagnosis of the same and spreading proper awareness about the health hazards associated with body weight is the need of the hour. The idea that a "Better diagnosis leads to a Better solution" is the inspiration of the proposed system. The proposed system is a desktop application that advises the user according to his/her requirement (gain weight, maintain weight, reduce weight). The application uses a combination of classification, clustering and association algorithms to efficiently direct all the given data to the best possible solution.

Keywords: Fitness, Advice, Clustering, Association, Classification, Data Mining, Health.

I. INTRODUCTION

The World Health Organization estimates that obesity has doubled over the last 25 years. Many adults over the age of 20 were considered overweight, while 11% of these adults were obese. Obesity increases the risk of many disease. Some of these disease are extremely harmful to health. If you are obese you are at higher risk of developing serious health problems, including heart disease, high blood pressure, type 2 diabetes, gallstones, breathing problems and certain cancers. That is why reaching and maintaining healthy weight is very important for overall health and can help you prevent and control many disease and conditions. However there are also many with the opposite problem of being too skinny. This is a concern, because being underweight can be just as bad for your health as being obese.

The proposed system uses data mining as the tool to bridge the gap between the diagnosis/solution and the user. Today the primary diagnosis of weight issues is based on exclusively considering the BMI(Body Mass Index). The proposed system is a an upgrade to this approach. The proposed system, considers various lifestyle factors(such as drinking, smoking etc) along with the BMI to efficiently diagnose the weight related health problem. Clusters are formed on the basis of the said factors, a clustering algorithm like k-means is used to achieve the same. Later the clusters are associated using association rules and further they are classified and directed to various experts for advice.

II. DETAILS EXPERIMENTAL

PROPOSED SYSTEM:

The proposed system can be seen as three different layers. In the first layer the user enters all the required data and a dataset is generated. This layer also acts as the front end of the system.

In the second layer the algorithms come in to play. The system uses clustering, association and classification algorithms. This layer is the decision making layer of the system and it directs the user to the expert advice. The clustering algorithm used in the system is k-means and the output is clusters. The clusters which are formed are associated with each other using association patterns.

Finally, these patterns are classified and directed to the respective expert advice with the help of a classification algorithm like ID3. The third layer includes the testing part which is done using a tool like WEKA. The confusion matrix which is generated in WEKA is used check the accuracy and efficiency of the system.

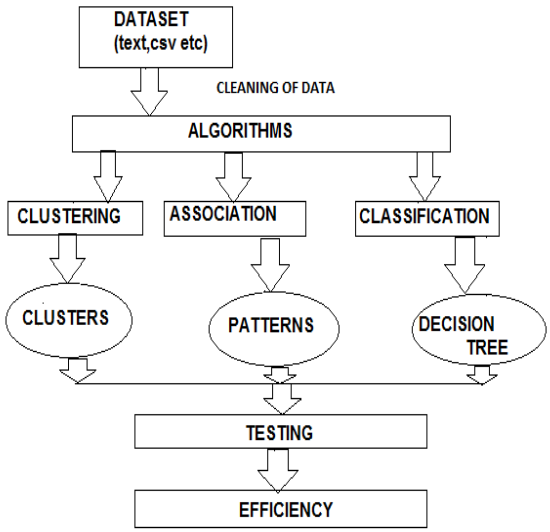

Fig.1. System block diagram of the proposed system illustrating the flow of procedures to be followed.

III. METHODOLOGY

IV. The proposed system efficiently uses a combination of clustering, association and classification algorithms to effectively deliver the best possible expert advice to the user's problem.

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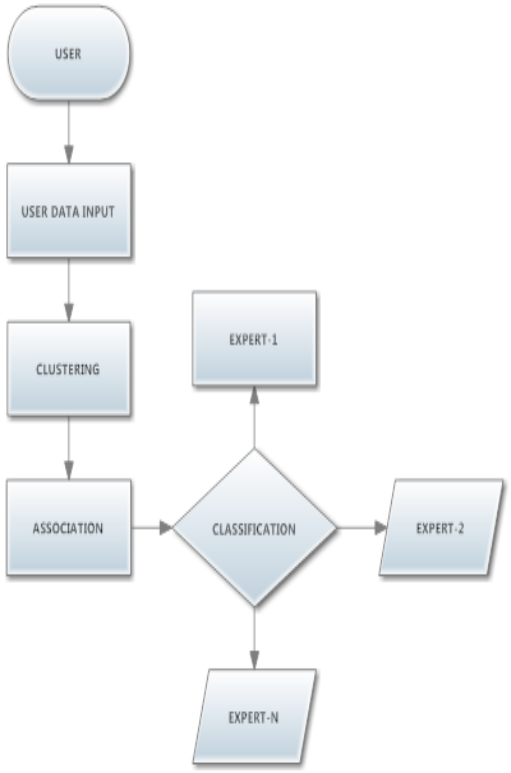

Fig. 2. Methodology of the proposed system displaying steps involved in the complete process, illustrating the flow of control and overall functioning of the system.

The working of the proposed system can be divided into four phases. In the first phase, the user is asked to enter his requirement from the system i.e. the user specifies if he wants to loose or maintain or gain weight. Along with this, the user is also asked to enter certain data(like height, weight, age, sex, body type etc) which will be used by the proposed system to direct the user to the most optimal solution to his/her problem. The proposed system considers various important aspects of the user's lifestyle and makes sure that these factors are incorporated in the decision making. These factors have been selected based on the research done and keeping accuracy in mind.

The factors that the system considers are as follows:
1. Height
2. Weight
3. Body Type
4. Sex
5. Smoking
6. Drinking
7. Health Condition
8. Physical Activity
9. Sleeping hours

BMI is calculated based on height and weight entered by the user. Once the data entering is complete, the user submits it.

In the second phase, the entered data is grouped into different clusters based on the data entered using a clustering algorithm like k-means. Clusters are decided based on the sub-groups of the factors. Each factor is divided into sub-groups and they are as follows:

1. BMI: Underweight, Normal, Overweight, Obese
2. Body Type: Ectomorph, Mesomorph, Endomorph
3. Sex: Male, Female
4. Smoking: High, Medium, Low
5. Drinking: High, Medium, Low
6. Health Condition: Depends on the user
7. Physical Activity: High, Medium, Low
8. Sleeping hours: 5-5.99, 6-6.99, 7-7.99, 8-8.99, >=9

Based on the above mentioned sub-groups the user's data is accordingly grouped into the respective clusters.

In the third phase, using association rules on the clusters, patterns are observed.

In the fourth phase, these patterns are then directed to the best expert advice for the said pattern using a classification algorithm like ID3. The final output of the system is a decision tree.

IV. CONCLUSION

The following can be concluded from the above study.

1. Factors other than BMI are required for diagnosing user's weight condition and the associated health hazards.
2. System can efficiently work as a cohesive data mining unit as decision making in automated.
3. More the number of experts more is the number of advices. This leads to a number of options being available for the system to choose from, which in short means better diagnosis and solution.
4. The system can be implemented in a health center and can direct a potential customer to the best possible expert available to tackle his/her problem.

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