Controlling of Heart Disease by Detecting the Threshold Value of Fast Food Eaters

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Abstract
Lifestyle modification is one of the risk factor for cardiovascular diseases.Fastfood plays a very important role in the lifestyle modification. Nowadays fast food is one of the essential foods in our day today life mainly in urban areas[12].In this paper, a discussion is made on how much intake of fastfood will lead to heart diseases and the threshold value for the fast food eaters using fuzzy rule based system is studied. Finally the threshold value for fast food eaters is detected.
Keywords: Fuzzyrule base,Fast food, Heart disease, Membership function

1. Introduction

Balanced food is one of the essential needs for our day-to-day life. But nowadays fast food culture plays an important role in our community mainly in urban area and this type of food contains high cholesterol,sugar and fat.Also such food causes chronic diseases like diabetes, high blood pressure, heart diseases and cancers. Fuzzy rule based system is applied in this paper and this rule base is from the fuzzy logic. Motivation of this research work is to analyze the cause of heart disease and to find the threshold value for the fast food eaters. The process of detection is designed in the way that the fast food eaters can use it himself. This paper explores the risk of heart diseases of the fast food eaters using fuzzy rule base system and it helps to find whether the person is having risk factor or not. According to the experts opinion it is concluded that the system consists of 64 rules. There are 6 attributes in this system four attributes are input attributes and two attributes are output attributes. 64 are the major factors and in this paper few of the important factors are discussed

1.1 Fast Food

Eat healthy and live healthy is one of the essential requirements for long-lifebutto-days world has been adapted to a system of consumption of fast foods. India fast food industry is growing by 40 percent a year. Statistics placesIndia in 10th place in fast food conception. Unhealthy diet is its cause & about 85% forms cardio vascular diseases [8].

1.2 Fast Food Effects Of Heart Disease

- The sodium in many fast food dishes may contribute to high blood pressure.
- Carrying excess body weight places unnecessary stress on joints and hearts.
- High cholesterol often results from consuming excess saturated fat and excessive amounts of cholesteroland high cholesterol can lead to the risk of both heart diseases and strokes.
- Fast food such as cheese burgers and fried shrimp that are high in fat and cholesterol can cause a buildup of plaque in arteries overtime. This condition is called as atherosclerosis;it affects heart function and also produces dangerous blood clots.
- A study conducted by Hamburg in Germany found that fast food also causes both acute and long term damage to the cardiovascular system.

1.3 Data set

According to expert's opinion the data should be fixed for this system. This system consists of four attributes for input and two attribute for result. Input attributes are 1) Activity level of the person 2) Fast food intake level 3) Calories level 4) Obesity (BMI) level. The output attributes indicates the 1) Risk of heart disease 2) Precautions

1.4 Input attributes

1.4.1 Activity level of the person

The activity level depends on the daily work of the people and there are five categories of peoples. Peoples are classified into the following types. Extra active, Very active, Moderately active, Lightly active, Sedentary

- Extra active person(very hard exercise/ sports and physical job or 2 training
- Very active person(hard exercise / sports 6-7 days a week)
- Moderately active person (moderate exercise/ sports 3-5 days week)
- Lightly active person (light exercise/sports 1-3 days week)
- Sedentary (little or no exercise)

1.4.2 Fast food intake level

There are several items of fast food in the fast food industry. Here we choose only 4 types of food items. Like burgers, pizza, French fries, sandwiches. The five different types of levels are very low, low, medium, high and very high. The range of fast food intake level is given by 1-14 pieces per week.

1.4.3Calories level:

Calories level is the range between 2,200-3000(for men) and 1800-2400(for women). Five different types of level are fix here very low,low,medium, high and very high [9].

1.4.4 Obesity (BMI) level:

Obesity occurs when you eat and drink more calories that you burn through exercise and normal daily activities.

- When BMI is greater than or equal to 25 is consideredas overweight.
- When BMI is greater than or equal to 30 it is considered as obesity.

The five different types of level are fixed here they are very low, low, medium, high, and very high. The normal range of BMI level is 19-21, 22-24, 25-29, 30-35, >40.

1.5 Output attributes

1.5.1 Risk of heart diseases:

The output attributes is that if how much intake of fast food will cause heart disease. The five different types are norisk, lowrisk, moderaterisk, risk and high risk. The range of heart disease is 0-1. If 0 means absence of risk and 1 means presence of risk.

1.5.2 Precautions

The precautions are depended upon the people result. The five different types of precautions are No need, Take low calorie fast food, Avoid daily intake of fast food, and change your activity level,exercise.

2.Rule Base

Rule base is the main part in fuzzy inference system (FIS) and the quality of results in a fuzzy system depends on the fuzzy rules this system includes 64 rules. Antecedent part of a rule has one section. This system designed with another rule bases (64 rules, 15 rules, 10 rules and 5 rules) and results showed in 64 rules system are best in comparison with results of the other rule bases. In the other hand, results with 64 rules tend to the experts idea.

S.No	Person activity level	Fast food intake level	Calories level	BMI level	Risk of heart diseases	precaution
1.	Extra active person	Very low	Very low	Very low	No risk	No need
2.	Extra active person	Low	Low	Very low	No risk	No need
3.	Extra active person	Medium	Medium	Low	No risk	No need
4.	Extra active person	High	High	Low	No risk	No need
5.	Extra active person	Very high	Very high	Medium	Low risk	No need
6.	Extra active person	Very low	Low	Low	No risk	No need
7.	Extra active person	High	Very high	Medium	Low risk	Take low calorie fast food
8.	Extra active person	Very high	High	Medium	Low risk	Take low calorie fast food
9.	Extra active person	Low	High	Medium	No risk	No need
10.	Extra active person	Medium	Very high	Medium	Low risk	Take low calorie fast food
11.	Extra active person	Low	Medium	Low	Low risk	Take low calorie fast food
12.	Extra active person	High	Medium	Medium	Low risk	Take low calorie fast food
13.	Extra active person	Low	Very low	Very low	No risk	No need

Table 1

S.No	Person activity level	Fast food intake level	Calories level	BMI level	Risk of heart diseases	precaution
1.	Very active person	Very low	Very low	Very low	No risk	No need
2.	Very active person	Low	Low	Very low	No risk	No need
3.	Very active person	Medium	Medium	Low	No risk	No need
4.	Very active person	High	High	Medium	Low risk	Take low calorie fast food
5.	Very active person	Very high	Very high	High	Risk	Avoid daily intake of fast food
6.	Very active person	Very low	Low	Low	No risk	No need
7.	Very active person	High	Very high	Medium	Low risk	Take low calorie fast food
8.	Very active person	Very high	High	Medium	Low risk	Take low calorie fast food
9.	Very active person	Low	High	Medium	Low risk	Take low calorie fast food
10.	Very active person	Medium	Very high	Medium	Low risk	Take low calorie fast food
11.	Very active person	Low	Medium	Low	No risk	No need
12.	Very active person	High	Medium	Medium	Low risk	Take low calorie fast food
13.	Very active person	Low	Very low	Low	No risk	No need

Table 2

S.No	Person activity level	Fast food intake level	Calories level	BMI level	Risk of heart diseases	precaution
1.	Moderate active person	Very low	Very low	Very low	No risk	No need
2.	Moderate active person	Low	Low	low	No risk	No need
3.	Moderate active person	Medium	Medium	medium	Moderate risk	Exercise
4.	Moderate active person	High	High	High	Risk	Exercise, Take low calorie fast food
5.	Moderate active person	Very high	Very high	High	Risk	Exercise, Take low calorie fast food
6.	Moderate active person	Very low	Low	Low	Low risk	Take low calorie fast food
7.	Moderate active person	High	Very high	Medium	Moderate risk	Exercise
8.	Moderate active	Very high	High	Medium	Moderate	Exercise

	person				risk	
9.	Moderate active person	Low	High	Medium	Moderate risk	Exercise
10.	Moderate active person	Medium	Very high	Medium	Moderate risk	Exercise
11.	Moderate active person	Low	Medium	Low	Low risk	Take low calorie fast food
12.	Moderate active person	High	Medium	Medium	Moderate risk	Exercise
13.	Moderate active person	Low	Very low	Low	Low risk	Take low calorie fast food

Table 3

S.No	Person activity level	Fast food intake level	Calories level	BMI level	Risk of heart diseases	precaution
1.	Lightly active person	Very low	Very low	Very low	No risk	No need
2.	Lightly active person	Low	Low	low	Low risk	Take low calorie fast food
3.	Lightly active person	Medium	Medium	Medium	Moderate risk	Exercise
4.	Lightly active person	High	High	High	Risk	Exercise, Take low calorie fast food
5.	Lightly active person	Very high	Very high	High	Risk	Exercise, Take low calorie fast food
6.	Lightly active person	Very low	Low	Low	Low risk	Take low calorie fast food
7.	Lightly active person	High	Very high	Very high	High risk	Change your activity level
8.	Lightly active person	Very high	High	High	Risk	Exercise, Take low calorie fast food
9.	Lightly active person	Low	High	High	Risk	Exercise , Take low calorie fast food
10.	Lightly active person	Medium	Very high	High	Risk	Exercise, Take low calorie fast food
11.	Lightly active person	Low	Medium	Low	Low risk	Take low calorie fast food
12.	Lightly active person	High	Medium	Medium	Moderate risk	Exercise
13.	Lightly active person	Low	Very low	Low	Risk	Exercise

Table 4

S.No	Person activity level	Fast food intake level	Calories level	BMI level	Risk of heart diseases	Precautions
1.	Sedentary person	Very low	Very low	Very low	No risk	No need
2.	Sedentary person	Low	Low	Low	Low risk	Take low calorie fast food
3.	Sedentary person	Medium	Medium	Medium	Moderate risk	Exercise
4.	Sedentary person	High	High	High	Risk	Exercise,Take low calorie fast food
5.	Sedentary person	Very high	Very high	Very high	High risk	Change your activity
6.	Sedentary person	Very low	Low	Low	Low risk	Take low calorie fast food
7.	Sedentary person	High	Very high	Very high	High risk	Change your activity
8.	Sedentary person	Very high	High	High	Risk	Exercise,Take low calorie fast food
9.	Sedentary person	Low	High	High	Risk	Exercise,Take low calorie fast food
10.	Sedentary person	Medium	Very high	Very high	High risk	Change your activity
11.	Sedentary person	Low	Medium	Medium	Moderate risk	Exercise
12.	Sedentary person	High	Medium	Medium	Moderate risk	Exercise

Table 5

According to the experts opinion of some doctors the 64 rules are shown below.

2.1Rules

Few important rules are discussed below

Rule 1: If (the person is extra active) and (fast food intake level is high) and (calories level is very high) and (BMI level is medium) then (the results is low risk) (Precautions is to take low calorie fast food).

Rule2: If(the person is extra active) and (fast food intake level is very high) and(calories level is high) and (BMI level is medium) then(the results is low risk) (Precautions is to take low calorie fast food).

Rule 3: If(the person is extra active) and (fast food intake level is medium) and(calories level is very high) and (BMI level is medium) then(the results is low risk) (Precautions is to take low calorie fast food).

Rule 4: If (the person is very active) and (fast food intake level is very high) and (calories level is very high) and (BMI level is high) then (the results is risk) (Precautions is to take low calorie fast food).

Rule 5: If (the person is very active) and (fast food intake level is high) and (calories level is very high) and (BMI level is medium) then(the results is low risk) (Precautions is to take low calorie fast food).

Rule 6: If (the person is very active) and (fast food intake level is low) and(calories level is high) and (BMI level is low) then (the results is low risk) (Precautions is to take low calorie fast food).

Rule 7: If (the person is moderate active) and (fast food intake level is high) and (calories level is high) and (BMI level is high) then (the result is risk) (Precautions isto exercise and take low calorie fast food).

Rule 8: If (the person is moderate active) and (fast food intake level is very high) and (calories level is very high) and (BMI level is high) then (the results is risk) (Precautions is to exercise and take low calorie fast food).

Rule 9: If(the person is moderate active) and (fast food intake level is high) and (calories

level is very high) and (BMI level is medium) then (the results is moderate risk) (Precaution isto exercise).

Rule 10: If (the person is moderate active) and (fast food intake level is very high) and (calories level is high) and (BMI level is medium) then(the results is moderate risk) (Precaution isto exercise).

Rule 11: If (the person is moderate active) and (fast food intake level is low) and(calories level is high) and (BMI level is low) then (the results is moderate risk) (Precaution is toexercise).

Rule 12: If (the person is lightly active) and (fast food intake level is high) and (calories level is high) and (BMI level is High) then (the result is risk) (Precautions is exercise and take low calorie fast food).

Rule 13: If (the person is lightly active) and (fast food intake level is very high) and (calories level is very high) and (BMI level is High) then (the results is risk) (Precautions is exercise and take low calorie fast food).

Rule 14: If (the person is lightly active) and (fast food intake level is high) and (calories level is very high) and (BMI level is very high) then (the results is high risk) (Precautions is tochange your activity level).

Rule 15: If(the person is lightly active) and (fast food intake level is very high) and (calories level is high) and (BMI level is high) then (the results is risk) (Precautionis to exercise and take low calorie fast food).

Rule 16: If (the person is lightly active) and (fast food intake level is low) and(calories level is high) and (BMI level is high) then(the results is risk) (Precautions is exercise and take low calorie fast food).

Rule 17: If(the person is lightly active) and (fast food intake level is medium) and(calories level is very high) and (BMI level is high) then (the results is risk) (Precautions is to exercise and take low calorie fast food).

Rule 18: If (the person is sedentary) and (fast food intake level is high) and (calories level is high) and (BMI level is high) then (the result is risk) (Precautions is exercise and take low calorie fast food).

Rule 19: If (the person is sedentary) and (fast food intake level is very high) and (calories level is very high) and (BMI level is very high) then(the risk is high risk)(Precautions is to change your activity level).

Rule 20: If (the person is sedentary) and (fast food intake level is high) and (calories level is very high) and (BMI level is very high) then (the results is high risk) (Precautions is to change your activity level).

Rule21: If (the person is sedentary) and (fast food intake level is very high) and(calories level is high) and (BMI level is high) then(the results is risk) (Precautions is exercise and take low calorie fast food).

Rule 22: If(the person is sedentary) and (fast food intake level is low) and(calories level is high) and (BMI level is high) then(the results is risk) (Precautions is exercise and take low calorie fast food).

Rule 23: If (the person is sedentary) and (fast food intake level is medium) and(calories level is very high) and (BMI level is very high) then(the results is high risk) (Precautions is to change your activity level).

Rule 24: If (the person is sedentary) and (fast food intake level is high) and (calories level is medium) and (BMI level is medium) then (the results is moderate risk) (Precaution is toexercise).

Conclusion:

In this paper, the fuzzy rule based system is used to detect the threshold value for the fast food eaters. The six attributes are used here out of which four attributes are input attributes and two attributes are output attributes. The detection is designed in the way that the fast food eaters can use it himself to find out whether the person is having risk of heart diseases are not. The conclusion of this study is that if the person is sedentary, even the low conception of fast food will lead to the risk of heart disease.

References:

[1] Sanjeev Kumar, Gursirmranjeetkaur, Detection of heart diseases usingFuzzy logic,International Journal of Engineering Trends and Technology(IJETT)-Volume 4 issue 6-June 2013.

[2]M.Nikaravesh, Janusz and loftiA.Zadeh,foring new frontier: fuzzy pioneer I,Springer 2007.

[3]K.Lavanya,M.A.SaleemDurai,N.Ch.Sriman Narayaniyenga, Fuzzy rule based inference system for detection and diagonosisof lung cancer, International journal ofLatest trends in computing, Volume 2, issue 1, March 2011.

[4]Ali.Adeli and Mehdi.neshat, A fuzzy expert system for heart disease diagonosis, Proceeding of the IMECS 2010 vol 1

[5]Mark A.PereiraThe lancet: fast-food habits, weightgain and insulin resistance(thecardia study):15-year procepective analysis, January 2005.
[6]Zadeh L.A, Knowledge representation in fuzzy logic, IEEE Transknowledge and data eng,pp.89-100,1989.
[7]Nabil D.Parasianishull, Project evaluation using fuzzy logic and riskanalysis techhniques", 2006.
[8]Sahaspormpaeratakul, fast food consumption among U.S adults and children: dietary and nutrient intake profile, Journal of theAmerican dietetic association, October2003.
[9] Katherine M.Glegal, prevalence and trends in obesity among us adults between 1999-2008, Journal of the American medicalassociation January 2010.
[10]U.S.Department of health and human services eating at fast food restaurants.insulin resistance andWeight gain, 2004.
[11]D.Mozaffarian, Tran's fatty acids and cardiovascular diseases The New England, Journal of Medicine,2006.
[12]Janet Currie, the effect of fast food restaurants on obesity, American Economic Journal, January2009.