Correlation Between Heart Activity, Certain Biomedical Traits and Heart Disease

Data Exploration

Heart Disease is a wide spread disease and is a leading cause of death, however it is preventable if detected in the very early stages before any damage has been done to the heart vessels. In the exploration of this data we will try to find any correlation between the biomedical traits of the individuals in relation to heart disease. For clarification the terms of the data is listed below:

1. age
2. sex
3. chest pain type (0,1,2,3)
    -- Value 0: asymptomatic
    -- Value 1: atypical angina
    -- Value 2: non-anginal pain
    -- Value 3: typical angina
4. resting blood pressure
5. serum cholesterol in mg/dl
6. fasting blood sugar > 120 mg/dl (fbs > 120 mg/dl = 1, fbs < 120 mg/dl = 0)
7. resting electrocardiographic results (values 0,1,2)
8. maximum heart rate achieved
9. exercise induced angina (1 = yes; 0 = no)
10. old-peak = ST depression induced by exercise relative to rest
11. slope: the slope of the peak exercise ST segment -
    -- 0: down-sloping;
    -- 1: flat;
    -- 2: up-sloping
12. number of major vessels (0-3) colored by fluoroscopy
13. thalassemia: 1 = normal; 2 = fixed defect; 3 = reversible defect
14. target: 0 = heart disease; 1 = no heart disease

There were a total of 11 charts made from the data comparing various medical traits. the first 4 charts are scatter plots where 3 variables could be determined the x variable, y variable and the color difference represented the presence or not of heart disease.

PLOT 1: y axis: resting blood pressure, x axis: age
In the first chart (Scatter plot) there is a comparison between age and resting blood pressure, there is positive correlation so as age increases resting blood pressure increases, we can also see that the presence of heart disease is more concentrated as the age increases.

PLOT 2: y axis: cholesterol, x axis: age
The next chart we are see a positive correlation between the age and the cholesterol is also visible that as the older the individuals get the more likely they were to have heart disease. And also there is a slight increase in the cholesterol levels as the individuals age.

PLOT 3: y axis: maximum heart rate achieved, x axis: age
There is a negative correlation between maximum heart rate and age, so as people age we can see that the heart rate slows down significantly, we can also see by that the number or yellow colored markers are more as the individuals age.

PLOT 4: pie chart fasting blood sugar percentage levels
There was a significant number of people had their fasting blood sugar below 120 mg/dl and out of those there was about 56.2% had fasting blood sugar below 120 mg/dl had heart disease, and about 50% of the people with blood sugar above 120 mg/dl had heart disease so we can see about the same percentage of people had heart disease in these two cases so from this chart there doesn't seem to be any correlation between fasting blood sugar and heart disease.

PLOT 5: pie chart exercise induced agina percentage levels
So we can see that out of tested patients the number of people with heart disease that have exercise induced agina is approximately 77% and the number of patients that have heart disease without exercise induced agina is approximately 30% there fore we can say that from these charts we can assume that there is a higher chance that someone with exercise induced agina to develop or have heart disease.

PLOT 6: bar chart comparing the types of thalassemia with presence of heart disease
There are 2 types of thalassemia which are either reversible which can be treated and corrected and the fixed type that comes from gene mutation and is not reversible. From the charts we can see that most people that do not have heart disease also do not thalassemia while approximately 64% of the people with heart disease had the reversible form of thalassemia which is a large percentage of people and from this chart we can suggest a correlation between reversible thalassemia and heart disease.

PLOT 7: bar chart comparing resting electrocardiographic results
There is no significant difference in results for the resting electrocardiograph so we can say there is no significant correlation directly between resting electrocardiograph results and heart disease.

PLOT 8: bar chart comparing chest pain and heart disease
From the results of this graph the most prevalent type of chest pain in the individuals with heart disease was asymptomatic chest pain, though there was also a sizable number of people without heart disease that also have that type of heart pain so there is no direct correlation with a particular type of chest pain and heart disease

PLOT 9: bar chart comparing st_slope and heart disease
The predictions from the chart suggest that people without heart disease have up-sloping ST segment while those with heart disease have a high number of flat ST segment, suggesting a correlation between flat ST segment and heart disease.