# Factors That Affect Costs For Health Insurances

REPORT BY CONSTANZE KRÜGER

WHAT ARE THE COMPONENTS IN A RISK-PROFILE?

Insurance companies use historic data to create risk profiles. After reviewing the information that is included in a health insurance application, the company decides about whether or not to provide an applicant with an insurance and how high the charges will be. The Analysis will show examples of groups an Insurance company has the most costs with.

SMOKER GENERATE HIGHER MEDICAL COSTS
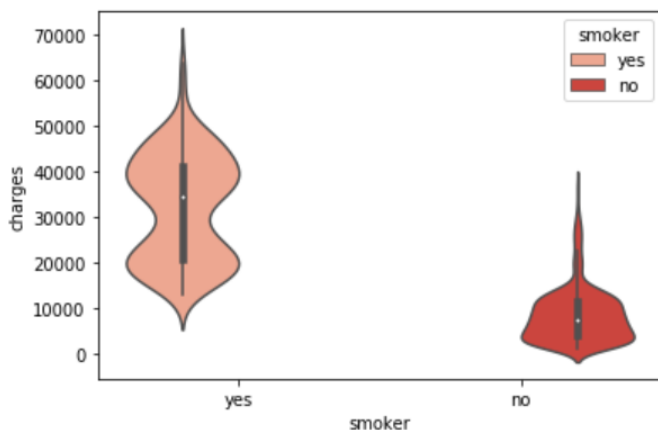
THE DATASET

The dataset gives an overview about Individual medical costs billed by an health insurance.
It includes data from 1338 people and displays several categories like "sex" and "region" as main demographic characteristics.

region	northeast	northwest	southeast	southwest	All
sex					
female	161	164	175	162	662
male	163	161	189	163	676
All	324	325	364	325	1338

RISK FACTOR SMOKER

As to see in the left picture, smoker are more expensive for a health Insurance company than non-smoker.
The cost for a smoker vary between 10.000 and 70.000 USD.
In this example, smoker are 75% more cost intensive than non-smoker.

#01
Risk factor is being a Smoker or not

1338
Different people with basic information about: age, sex, bmi, children, smoker, region, charges

75%
Is the average percentage a insurance company has to pay for a smoker.

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RISK FACTOR AGE

The graph to the right illustrates the correlation between age and charges as well as the correlation between being a smoker and charges. Both correlations are positive whereas the light dots symbolize smoker and the dark dots symbolize non smoker. Non-smoker generate lower costs for a health Insurance company. People generate more costs when they get older. This seems to be a very stable increase. Of course some values deviate from the more concentrated values but the tendency for the increase is still given.
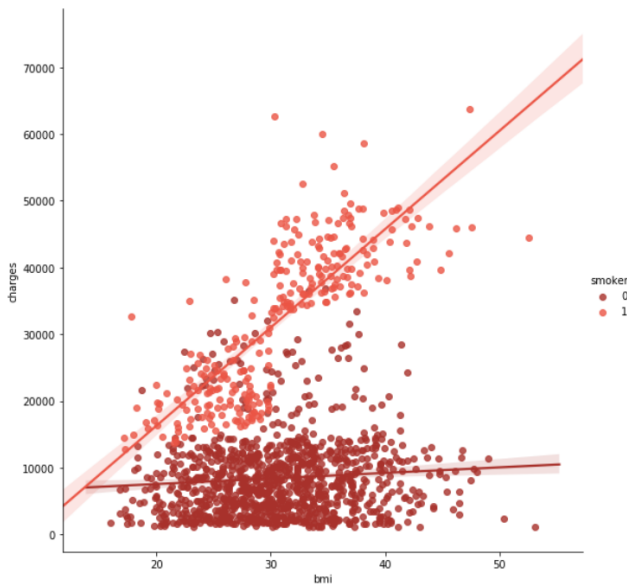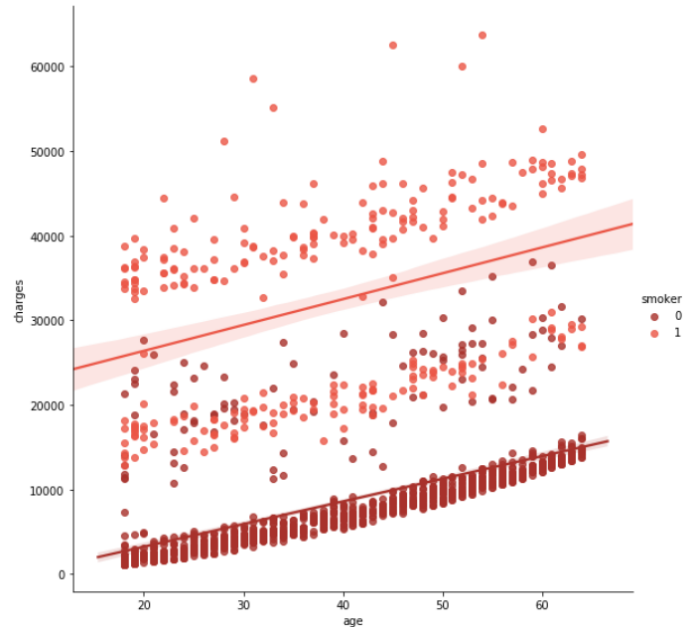
RISK FACTOR BMI

Body mass index (bmi) is a measure of body fat based on height and weight. The graph on the left pictures a regression model of the characteristics bmi, being a smoker and charges. According to the WHO, people with a bmi greater than 30 are considered obese. The average of the Individuals in the dataset have a bmi from 30.6. Smoker and people with a high bmi generate higher costs than non-smoker with a low bmi. The correlation between bmi and charges is very low, and both values are only slightly increasing with an increase in bmi.

30.6
The average bmi of the the Individuals in the dataset.

## #02
Risk factor is the Age.

#03
Risk factor is the BMI.

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DIFFERENCES IN REGION

The anonymous Individuals in the dataset are from different regions in the Unites States. They are grouped into four categories: "northwest", "southwest", northeast" and "southwest". And even if there is a very low correlation between charges and region (graph to the right, 1 = perfect correlation, 0 = no correlation), the graph "charges by region" demonstrates that there is a difference between the regions east and west.

charges by region
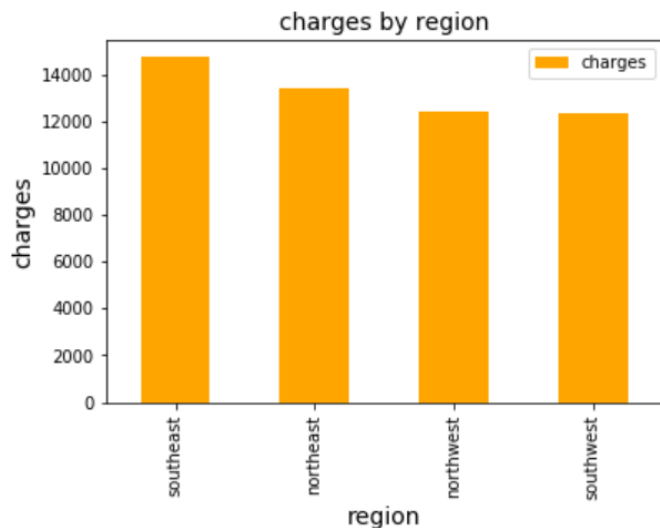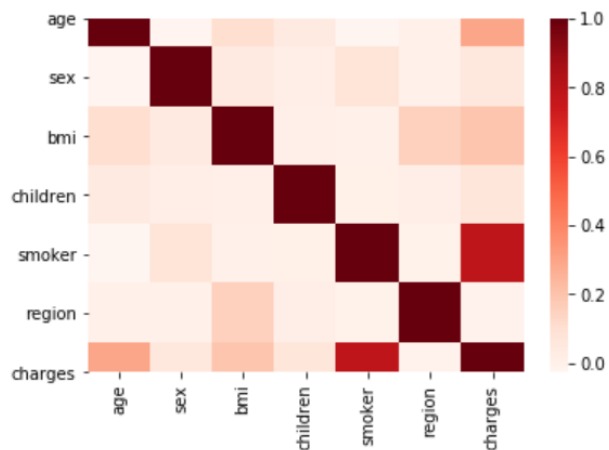
Individuals in the east of the United States generate more costs for the health Insurance company.

To summarize, a health Insurance company should consider being a smoker, bmi and age as risk factors into the risk profiles.

#01
Risk factor is being a Smoker or not

#02
Risk factor is the Age.

#03
Risk factor is the BMI.