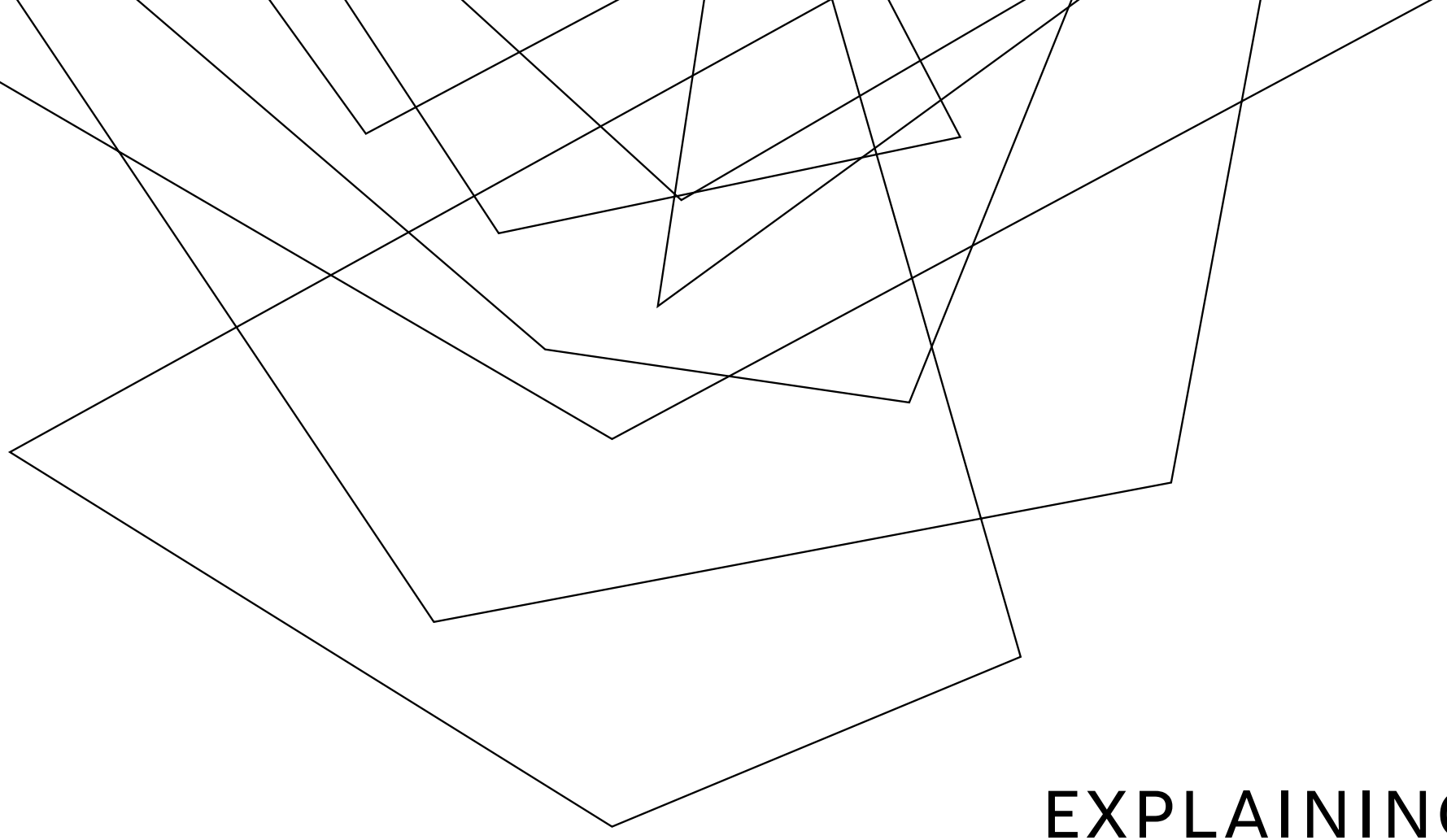


EXPLAINING SHAP MODEL

Faris Haikal Firdaus

EXPLAINING SHAP MODEL

The dataset provided are consisting of 5110 samples (patients) in a number of factors which directly or indirectly contributes to the risk of stroke. Based on the predictions (outcomes) provided using the SHAP model, the explanations can be divided in such ways:

Global explanation:

- Explaining SHAP model: as data scientist

  - Explanation as a whole dataset

Local explanation:

- Explaining SHAP model: as doctor and as patient

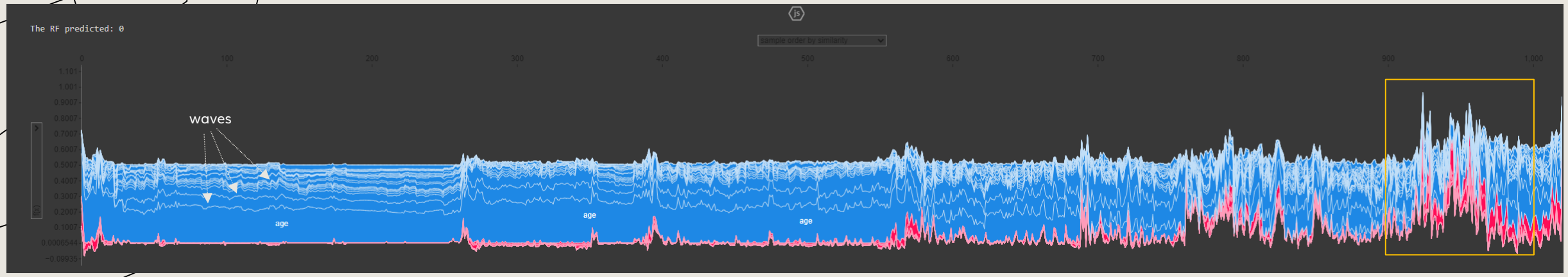
  - Take one sample and interpret the analysis

  - what advice can the doctor provide to the patient

  - what can the patient do to mitigate the risk of getting stroke

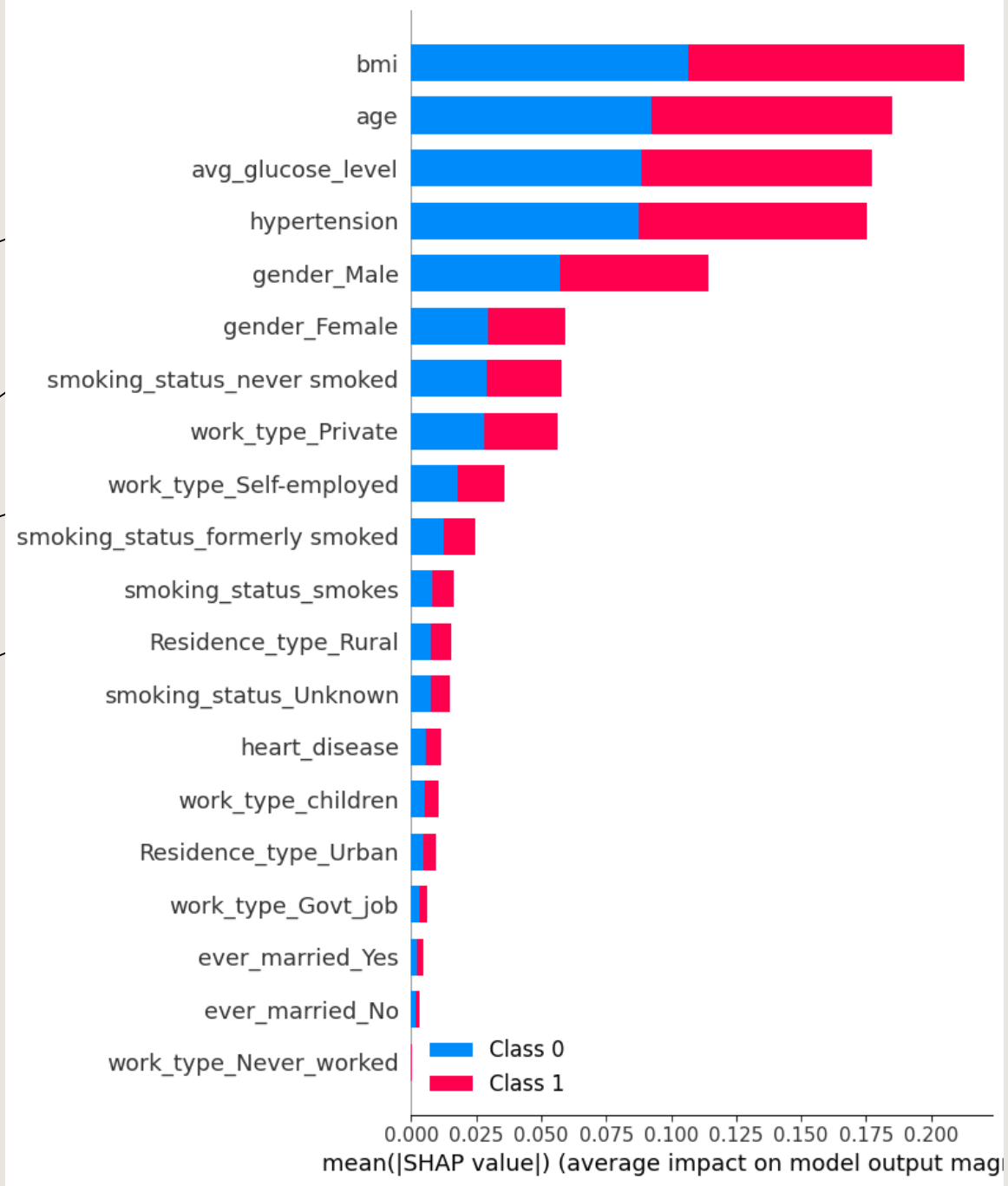
EXPLAINING SHAP MODEL

As data scientist



The graph above shows the prediction results for all 5110 samples. Every single waves shows every single factors in the dataset on what contributes to the stroke risk. *The higher the waves means the higher predicted risk of getting stroke (in average). The red area represents what or which of the factors increases the overall risk and the blue area represents the factors that decreases the overall risk of getting stroke.

*For instance, refer yellow box area at the right side.



EXPLAINING SHAP MODEL

As data scientist

Bar chart lists out all the factors that contributes to the risk of stroke based on the dataset, ranked from top to bottom based on the importance of how it contributes to the overall risk of stroke (the length of bar chart).

From the bar chart, we can tell that the top five (5) factors that leads to the increasing or decreasing of the probability (prediction) of stroke are:

- bmi (BMI)
- age (patient's age)
- avg_glucose_level (patient's body glucose level)
- gender (male or female)

EXPLAINING SHAP MODEL

As doctor

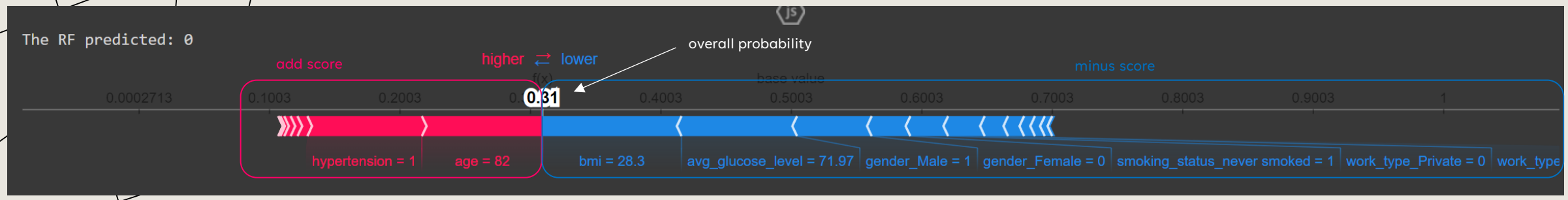


Figure above shows the risk prediction of one patient for getting stroke. From the graphical representation, the more red area means the higher risk it contributes to the prediction of the probability of the patient to get stroke. In short let's just term it as below

Red area = add (+) score

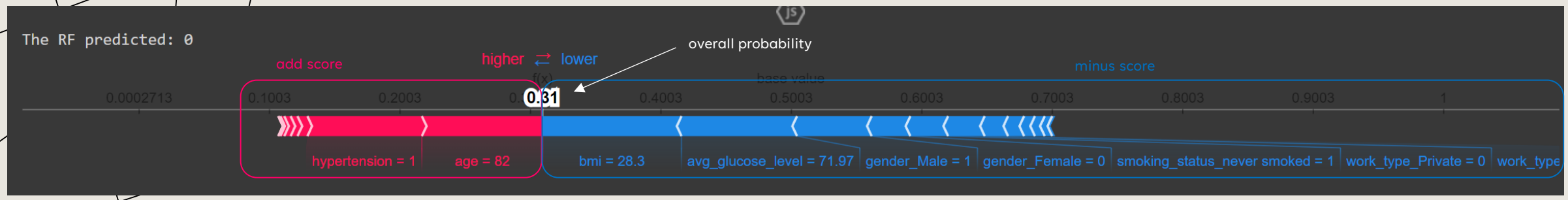
Blue area = minus (-) score

Add score raises the average score (the probability) of the (predicted) patient's stroke risk

And minus lowers the average score of the predicted stroke risk.

EXPLAINING SHAP MODEL

As doctor



Analysis (technical):

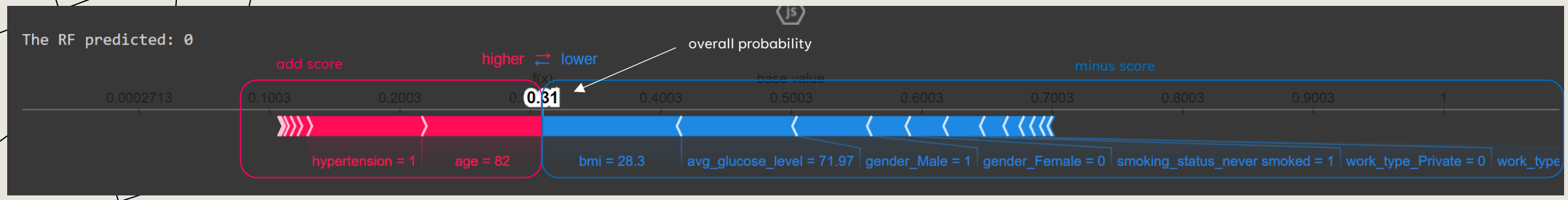
- The biggest portion in the add score is the patient's age (82) and hypertension (1, means the patient has hypertension)
- The biggest portion in the minus score is the patient's BMI (body mass index) and patient's glucose level.
- The predicted probability of the patient to get stroke is 31% (0.31)

Analysis (medical/as a doctor(what can the doctor do with the interpretation)):

- In general stroke is a disease. So in order to keep the patient healthy, the doctor would have to provide the best advice to lower the risk of the patient to get stroke.
- To lower the risk (overall), the doctor can give advice to increase the weightage of the minus score such as:
  - the patient should maintain a healthy BMI
  - the patient should have a healthy diet to maintain or lower the glucose level

EXPLAINING SHAP MODEL

As patient



Analysis (technical):

- Based on prediction, the patient can identify which are the factors that will/might raise the risk of getting stroke. Given the sample as above, the patient has hypertension and is old of age (82 y/o). The patient also have a good BMI and good average glucose level which contributes in lowering the overall risk (probability) of getting stroke.

- The prediction shows a 31% (0.31) probability for the patient to get stroke, by considering all the factors in both add score and minus score.

Analysis (medical/as a patient(what can the patient do with the interpretation)):

- The objective is to keep healthy, hence decreasing the add score by increasing the minus score.

- The patient can keep a healthy diet by decreasing the intake of unhealthy food such as food with high fat level and/or contains a lot of sugar.

- The patient can also be suggested to exercise regularly and avoid alcohol and drug intake, which is a good way to mitigate hypertension.