

Answers

1. When changing the threshold (TH), the calculated rate model score is affected, consequently influencing the interest rate. Lowering the threshold results in a decrease in the model score, leading to lower interest rates and ultimately, a higher approval rate. Conversely, raising the threshold increases the model score, resulting in higher interest rates and a decrease in the approval rate.
2. An error might occur when one of the components failed to output the expected result. For example:
 - Error in credit bureau API:
 - Error in the fetching the credit features, there is no sufficient data about the Applicant.
 - Invalid Requested amount:
 - Negative requested amount.
 - A number that exceeds the maximum allowed requested amount.
 - Error in the Rate_model:
 - Invalid data input
 - Invalid threshold (TH)
 - Invalid output (for example the rate score is always -1)
 - Error in the Risk_model:
 - Invalid data input
 - Invalid output (for example the rate score is always -1)
 - Error in Pricing table:

Incorrect mapping of pricing scores to interest rates in the pricing table might result in offers being assigned incorrect final rates.
 - Error in Convertor A or Convertor B:

Incorrect conversion of rate model scores or accurate interest rates may lead to discrepancies in the final offer rates.
 - Algorithmic Errors:

Errors in the algorithms used by various components, including models, converters, or alignment processes, could produce incorrect results and impact the overall accuracy of the offer generation process.
3. It's applied at the end of the flow for several reasons:
 1. Consideration of Other Factors:

Placing the DTI restriction after the pricing table allows for the consideration of other important factors such as interest rates and risk assessment. These factors play a significant role in the decision-making process and need to be assessed before applying additional constraints.
 2. Loan Restrictions Alignment:

Placing the DTI restriction at the end ensures that it aligns with other loan restrictions. By verifying the DTI after considering factors such as interest rates and risk assessment, the decision-making process adheres to all relevant criteria, ensuring that approved loans meet all necessary requirements.

4. Explain if there's an issue in the following response outputs - Make sure to refer to each application as a standalone:

App #1

- Offer 1, DTI is not < 0.5 , the Decision should be Declined.
- Offer 2 is correct based on the current data values, however the DTI value is incorrect, a loan of 10,000 is 0.52 DTI and a loan of 12,000 takes 0.61 DTI, then the DTI value of a loan of 11,000 should be between 0.52 and 0.62, the income didn't change when applying for 11,000 loan.
- The rate score of offer 3 is incorrect, based on the Pricing table the rate is 13
- Converter A isn't applied, offer 3 rate should be 13.

App #2

- The Pricing Score is consistent with the rate score and all the offers individually follow the decision making and are correct.
- There are some contradictions in the table, for example:
The Risk score of a 7,000 loan with 10 interest rate is 0.82, however the risk score of a bigger loan of 9,000 with higher interest rate of 14 is lower. **It should be higher.**
Based on the 1 and 3 offers and the increase in the rate of interest, the output of the models in offer 2 should be a middle ground between offer 1 and 3 and should be approved.

Bonus:

App #3

We lowered the threshold, which resulted in lower interest rate which is consistent with our decision-making process.

Converter A was applied since the rate of offer 1 equals the other offers (it should be 9 after applying the risk score and 10 after the Int rate alignment).

If we examine offer 2 and 3 we can notice some inconsistencies, the risk score should increase with increased loan amount if the loan rate is consistent.

Part 2

- Solution in word_operations.py