Q1. Experts observe that the results are not always the desired ones. This is because some rules are very important, which they consider "golden rules", while others may serve in some cases, but are less relevant to the risk. How could Mamdani's inference system be modified to solve this problem?

In order to solve the issue of prioritizing some rules, a mechanism for assigning weights, based on the importance of the rules, could be introduced. The Golden rules must have a higher weight than the others in order to ensure that their influence on the final decisión is stronger. A process of expert evaluation and data analysis would be used to determine the relative importance of each rule.

Q2. Another observation is that extreme risk values are never obtained. What could it be due to? What is the maximum value that can be obtained with the described system?

The absence of extreme risk values is likely attributable to the fact that each rule of the system considers a moderate number of input variables ranging between two and three (the maximum is four in only one rule with moderate risk). Consequently, when evaluating a single application, it's possible that multiple rules with distinct assessments are applied, each stemming from a different combination of the same input variables. As a result, an average risk should be derived from all the results obtained by applying the appropriate rules. The maximum value obtained is 79,58 for application 0029.

Q3. Banco Pichin has been acquired by a much larger bank. Within a month, the system will have to process hundreds of requests more than now and the result is to be obtained in just a few seconds to impress the new owner. You can't spend anything on hardware and all possible optimizations to the software have already been made. How could it be achieved?

To optimize the system's performance under increased workload and time constraints, several strategies can be considered. One of them may be implementing parallel processing techniques in order to distribute the workload across multiple processors. Another one may be utilizing caching mechanisms to store intermediate results and avoid redundant computations. Reviewing the algorithm and data structure of the system in order to optimize it must be the first thing to do.