SECOND PROJECT SPECIFICATION

Project title: An industrial production line with intelligent machines.

First part main goal: Minimize Time.

Summary:

In the first part of the project, we developed a factory that produces products based on the orders it receives. For this, there was a need to allocate machines that were capable of answering to certain orders while minimizing the time needed to fulfil each order.

The orders contain a list of tasks that need to be done in order to produce a product and they give credits as a reward for the machines who fulfil the tasks.

Each machine has a role, an average time it takes to perform a task and proactivity and honesty factors that define how willingly the machine is to do tasks as well as how much they lie in order to get the tasks. Machines compete in order to obtain an order's task.

During the communication between order and machine, the machine proposes a time it expects to finish the task given by the order. If the order is not satisfied with it, it can try to negotiate with the machine by increasing the credits given. The machine can decrease its execution time based on the credits proposed in the negotiation process by comparing them with the average credits received per task.

Data Analysis problem:

The data analysis problem we're going to solve using RapidMiner is related to the negotiation process. An order can propose to give more credits to a machine for the machine to improve its execution time. It can only propose up to 3 times, so it would be useful to know how much credits it needs to increase so that the machine proposes an execution time that is desirable. As such, the order will try to predict the machines' behaviour during the negotiation process in order to find the right amount of credits for the machines to accept a decrease in the execution time for the task.

1. **[Classification Problem]** If the order gives more credits to a machine, will it execute the task at the desired time?

   Variables:
   Independent:
   - order's initial credits.
   - order's increased credits.
   - increment in credits.

- machine's proactivity.
- machine's honesty.
- machine's average time.
- number of machines competing.
- machine's average credits.
- machine's initial execution time.
- order's desired execution time.
- difference between desired execution time and machine's initial execution time.

Dependent:
- machine's execution time.

2. **[Regression Problem]** How does a machine's execution time vary when an order increases the credits given during the negotiation process?

Variables:
Independent:
- order's initial credits.
- order's increased credits.
- increment in credits.
- machine's proactivity.
- machine's honesty.
- machine's average time.
- number of machines competing.
- machine's average credits.
- machine's initial execution time.

Dependent:
- machine's execution time.

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