Norwegian University of Science and Technology

TPK4186

Advanced Tools for Performance Engineering

Assignment 2- Risk Assessment

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Introduction

The classes required are initialized in the main module after importing all the required modules. First it reads the files using the parser modules and checks it for the design-rules. If it fails, an error message is displayed in the console. If it passes it then goes into the “if” statement where it executes the function to create the html file that has the report of the experiment. The report has a summary of elements in the diagram, the statistics of the total duration simulation, summary of the machine learning implemented and an inference about the experiment conducted.

Modules Implemented

The different modules implemented in the program are: -

DataStructure

The function of this module is to create the elements in the circuit. This module consists of the classes required to create different elements like tasks, gates and lanes. Functions are also implemented to return the attributes of the different elements.

XMLInterface

The function of this module is to read the elements of the files in .xml format and allocate it to the appropriate elements using the functions in the DataStructure module.

MonteCarloSimulation

This module performs 3 main functions: -

1. This module checks the model for the different conditions that are to be followed as given in the problem description.
2. This module performs the calculation that are needed to execute Monte-Carlo Simulation and assess the required statistics.
3. Also has a function called CompletionDatesOfNodesBeforeGivenGate which finds the completion dates of all nodes preceding a given gate and is used in the next modules.

Classifier

This module creates a sample to perform the classification algorithms and the implement 3 algorithms: Logistic regression, Stochastic Gradient Descent and Multi-Layer perceptron. It also calculated the accuracy of these algorithms for 3 maximum dates (96,102,108).

Regressor

This module creates a sample to perform the regression algorithms and the implement 3 algorithms: Ridge regression, Lasso and K-Neighbours regressor. It also calculates the accuracy of these algorithms.

HTMLInterface
This module helps to present the results in an html file.

Main
This is used to execute the program in the sequence needed.

Points to be noted

- The module DataStructure is basically modification of the PERT program done in the class, so a lot of similarities could be found.
- Same with calculator, it is also an extension of the same program.
- The third condition for the design (These is no loop in precedence constraints) was not assessed, this was written optional in the question though.
- Extensive checking of the XML parser was not done mainly due to the difficult in making new xml files, it is found working for the given problem seamlessly.
- For the checker it is suggested to use recursion technique but the method presented is used since it was found easier to execute, however again extensive testing was not carried out in this phase.
- The number of trials is given the value 10000. Similarly, the gate for performing classification and regression is given as Mid Project. This could be changed in the main program manually.
- DiagramTemplate is the name of the template file, actual file is called Risk assessment.
- Some variations from the conclusions were observed during the testing phase, it is basically a generalization of the most frequent observations.
- An xml printer is asked to be programmed in the question, this however is not implemented since only one file format was provided and hence this functionality was deemed as nice to have and exempted. This could however be done if needed and the skill has already been exhibited.

Further Works

- While performing the machine learning algorithms, many arguments were disregarded, for instance, the alpha value in lasso. This is one part where the program quality could be improved and the impact of these factors are to assessed.
- An improvement of the HTML file from the previous assignment was tried, but couldn't finish satisfactorily within the deadline.
- The k-neighbors is said to be the least accurate, this could be due to also this fact as the number of neighbors chosen (5) may not be correct, the significance of this should also be further evaluated.

Conclusion
All the functionalities that were asked is believed to be implemented in the script.