University of New Brunswick

CS 6075- Project Team 12

AI Tool kit

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Contents

Project Description

In this project, we have refactored a python code containing four AI classification algorithms (Naive Bayes, ID3, Adaboost, and Feed-Forword Neural Network). The four algorithms approximately consist of the same functions (train, extractFromModel,... etc) but different logics. The python file had a lot of coupling and was not properly structured.

We chose 5 design patterns which are factory method, singleton, prototype, mediator and templete design patterns. We have also implemented additional features to the project like a logger (using Singelton), data class to copy the data set using prototype pattern to implement cross-validation technique, and UI for training the model for implementing mediator pattern.

Source code repository:

Original Source Code: https://github.com/ab-mustafa/Basic-Machine-Learning-Algorithms.git

Refactored Source Code: https://github.com/ab-mustafa/Refactor_AItoolKit

Video Link:

Team Members:

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Contribution:

1- Refactored Naïve Bayes and Adaboost by using the same interface and implemented the code using Factory design pattern. It makes the code extensible in case adding new machine learning algorithm in the future.
2- Implemented logger class using singleton design pattern so that all the clients that uses logger class will use the same instance of this class, and this class help will the developers to track the behavior of the code, and each log in the log file contains information about the date, time, type of log, filename, line number, and log message.
3- Refactored File Manager class by using Template design pattern that supports reading data sets from Excel sheet and text files, so in the future, the client can support other types of data files like Json and XML.
4- Built simple user interface to interact with the implemented code instead of command prompt, and we used mediator design pattern to connect the implemented code with UI code.We implemented components of the UI such as buttons, drop down lists, and text inputs. This reduces the coupling between the UI and the logic code part, and at the same time we achieve single responsibility and open close principle.
5- Refactored a part of the code related to cross validation technique by using Prototype design pattern, which facilitates the shifting and shuffling of the data sets.

UML Diagram:

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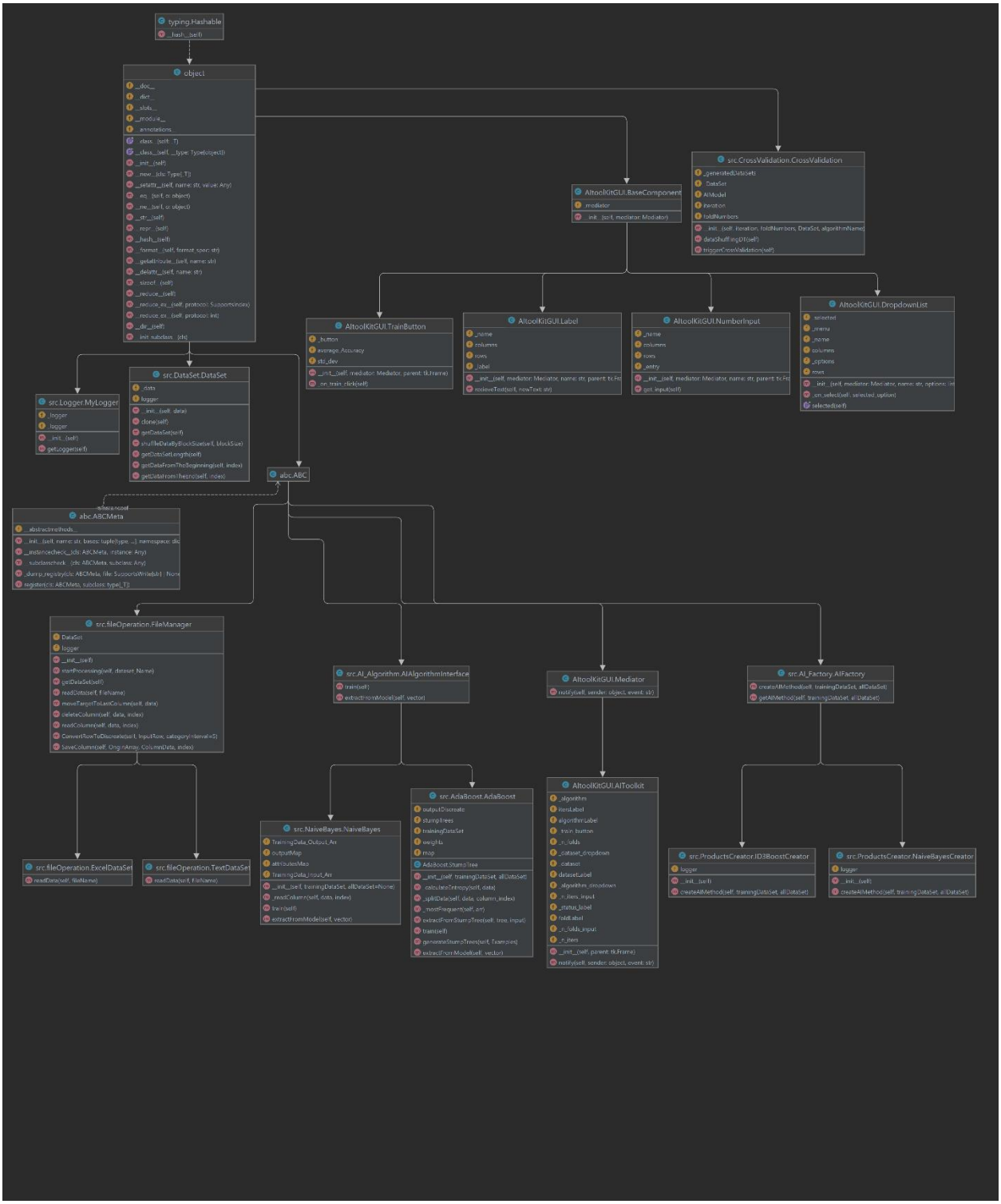

Project Environment:

Programming language: Python 3.10.6

IDE: PyCharm

Libraries: In the project we used group of external libraries like math, numpy, abc, copy, pandas, logging, statistics, and tkiner, and these libraries can be installed using this command “pip install library_name”.