<Assignment 5 > Software Design Document

CS2300 Section 1 Spring 2022

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Project Description

Describe the problem you are addressing in your own words.

I have to use the power method to correctly rank a set of pages and I have to use the perceptron algorithm to do linear binary classification on a set of features.

Approach

Describe how you solved the problem, providing an outline of the program logic.

Part A is a simple page rank algorithm that uses the power method to find the rank of the pages. Part B implements the perceptron algorithm to find the correct weights and to determine if a set of features are in the group.

Detailed Design

Programming Language

Describe the programming language (and version, if relevant). If there are unique features of the language that are important to your approach, describe them.

I used C# for this assignment because of my familiarity with the language. I have also worked with 2d arrays in C# and felt more comfortable using it then using any other language when it came to matrices. A unique feature of C# is the file I/O, it is in my opinion easier to read and write files with C#.

Modules

Provide a brief description of each module in your program, including the inputs, the outputs, and the actions that the module takes on the data.

Part A:

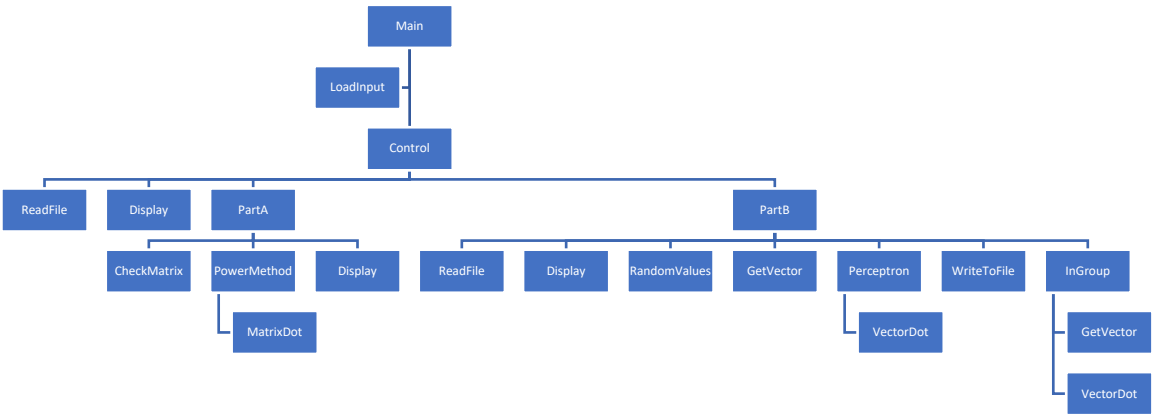
PartA(): Runs Part A
PowerMethod(): performs the powermethod to find R

Part B:
PartB(): Runs part b from triangles
Perceptron(): Performs the perceptron alogrith to find the weights
InGroup(): Determines if the feature sets are in the group based
on the final calculated weights.

Helper Methods:
GetVector(): Gets row vector at specified row and col of a matrix
CheckMatrix(): Checks matrix columns add to 1
RandomValues(): creates a 2d array of random values based on row and col
Control(): Calls initialization methods to start part a and b
VectorDot(): performs vector dot product
MatrixDot(): performs matrix dot product
WriteToFile(): writes matrix to file
LoadInput(): loads input files and stores them in a list of strings
ReadFile(): reads file and loads values into matrix
Display(): displays matrix

Flowcharts

Provide a flowchart describing how the modules interact. If you have only one module, then use the flowchart to describe its main logic.



Key Data Structures

Describe the data structures that are important to your approach.

The data structures that were important to my approach were the 2D arrays used as matrices and vectors

Test Description

Describe the input files used for testing your code, explaining why you're using each one for testing and how it shows your program is working correctly.

I used the given input files for the program and I made sure they the program was working correctly by going over a few iterations by hand.