BBM203 PROGRAMMING LAB.
ASSIGNMENT 1

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1 Problem Definition

The main subject of this assignment is manipulation of matrices and vectors. There are various functions that operate with matrices and vectors. The program creates matrices&vectors and makes mathematical and reorganizing operations with them.

2 Methods and Solution

The commands and input values for structure of matrix and vector are read from files. This assignment also writes results to output file whose name is decided by user. Also there are lots of dynamic memory allocation, reallocation and free operations. All the structures are handled with this dynamic memory functions and there is no restriction for number of structures.

3 Functions

3.1 veczeros

The function creates new vector and checks arguments for any incorrect situations such as double naming and incorrect number and format of arguments. Then fills new vector with the value 0. Lastly writes to output file.

3.2 matzeros

The function creates new matrix in given size and checks arguments for any incorrect situations such as double naming and incorrect number and format of arguments. Then fills new matrix with the value 0. Lastly writes to output file.

3.3 vecread

The function takes the name of file ,from where it reads values of vector, as an argument. It decides all the specification of vector from file. So this function includes file operations as well dynamic memory allocations in other functions. The returning value of -1 denotes error and 0 denotes terminating program to main and 1 successful situation. At the end after checking errors in command, it creates the vector same as in file.

3.4 matread

The function takes the name of file ,from where it reads values of matrix, as an argument. It decides all the specification of matrix from file such as row and column lengths. So this function includes file operations as well dynamic memory allocations in other functions. The returning value of -1 denotes error and 0 denotes terminating program to main and 1 successful situation. At the end after checking errors in command, it creates the matrix same as in file.

3.5 vecstack

This function combines two vector and so forms a new matrix. The matrix's name given in command. Function fills the new matrix with the corresponding vectors' values according to direction parameter in command. This function also checks the conflictions in names of vectors and matrices.

3.6 matstack

This function combines two matrix in place of the first matrix. Argument of the command decides where of matrix to combine the other(right or down). It checks the bounds of the matrix and alerts an error if there is incompatibility. So as stated above, this matrix changes the first matrix values and size.

3.7 mvstack

This matrix extends a matrix with given vector. So it changes the size and values of matrix. The function also checks for any incorrect format and sizes in the command values. That is, if there were any wrong bounds of the matrix and vector size, it alerts an error and terminates the program.

3.8 pad

This function extends the matrix with given name towards right and down. When filling matrix with values, it looks to the command for parameter. If the argument in the command is "maximum", it gives the maximum value in the corresponding vector in the matrix. Similarly in the case of "minimum" parameter it fills with the minimum values. Also it checks for the incorrect form of values of sizes.

3.9 padval

This function extends the matrix and basically fills with the given value. It also checks for any incompatible values of parameters. In negative case, it alerts error message.

3.10 vecslice

This function takes a slice form a vector and with this slices values and size it creates a new vector. It also checks for wrong sizes and invalid formats of parameters. If there is an error, it alerts the error.

3.11 matslicecol

This function creates a vector from a matrix's column with the given size. It also checks the compatibility in sizes of vectors and column of matrix. If there is a wrong situation as name or size specifications, it alerts an error.

3.12 matslicerow

This function creates a vector from a matrix's row with the given size. It also checks the compatibility in sizes of vectors and row of matrix. If there is a wrong situation in name or size specifications, it alerts an error.

3.13 matslice

This function extracts a new matrix from another matrix. The new creating matrix takes the values corresponding part of the old matrix. If there is incompatibility in sizes of matrices, the function alerts an error message.

3.14 add

This function basically adds the values of the matrices element-wise. The sizes of the matrices needs to be checked. If there is incompatibility, it must alert an error.

3.15 multiply

This function basically multiplies the values of the matrices element-wise. The sizes of the matrices needs to be checked. If there is incompatibility, it must alert an error.

3.16 subtract

This function basically subtracts the values of the matrices element-wise. The sizes of the matrices needs to be checked. If there is incompatibility, it must alert an error.

There are also auxiliary functions such as freeing buffers, printing to file, validating, reformatting and file reading.