Readme -Subtask-1 For Creating a small audio processing library

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Introduction to task :-

In this given subtask we made some c++ functions using the float datatype in order to evaluate some vector and matrices operation like conversion of matrices using fully connected layer via inner matrix multiplication and matrix addition , use of activation functions like relu and tanh on individual matrix elements, subsampling of matrices using max pooling and average pooling and finally converting vector elements into probabilities using softmax and sigmoid functions.

Explanation of Code Structure :-

Here in our code base, we have 1 c++ file named yourcode.cpp which is the file containing our main function. In the code of yourcode.cpp I have structured all the operations related to the matrices inside the Matrix class in the form of matrix methods along with the short and precise description of what each method is capable of which is quite clear from the method name itself (given in the form of 1-2 line comments just before each method). The only matrix operations which are defined outside the matrix class are the one related to readMatrix and writeMatrix which take string inputs(the filenames given from command line) and the do the desired operation. As for the vector operations like sigmoid and softmax, they are defined in the form of functions in our yourcode.cpp file. Now as for the code inside the main function, I have taken the arguments from the command line using the **int main(int argc, char** argv)** statement which will assign the pointers of input strings to argv here. Finally for the error raising, this has been taken care of using

the **throw invalid_argument(error)** statement which will throw errors when required while execution of our code and these errors have been smoothly dealt using **try catch** blocks inside our main function.

Preprocessor Directives Used in Code:-

The directives used in our code are **vector, iostream, cmath, fstream** where vector is used to use vectors in our code, cmath for exponential function and iostream and fstream for reading and writing files.

Executing the program:-

1. First of all run make in commandline after opening the directory containing the **yourcode.cpp** and **makefile** using **cd** command.
2.After running make in command line, it will create a **yourcode.out** file in the present working directory.
3. Finally run the required function using the commands below

3.a ./yourcode.out fullyconnected inputmatrix.txt weightmatrix.txt biasmatrix.txt outputmatrix.txt

3.b ./yourcode.out activation relu inputmatrix.txt outputmatrix.txt

3.c ./yourcode.out activation tanh inputmatrix.txt outputmatrix.txt

3.d ./yourcode.out pooling max inputmatrix.txt stride outputmatrix.txt

3.e ./yourcode.out pooling average inputmatrix.txt stride outputmatrix.txt

3.f ./yourcode.out probability softmax inputvector.txt outputvector.txt

3.g ./yourcode.out probability sigmoid inputvector.txt outputvector.txt