Project Diary

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- Team Meet 1 : 9:15 - 10:45 10th October 2014
  Our first team meeting was for 1.5 hours, in it we discussed the scope of our project, and which features to include.
  We discussed the general concept behind each facet of our project, such as the functionality of the parser, the advantages of methods of numerical definite integration over symbolic indefinite integration, the different computational methods of differentiation, Cramer's rule to solve linear equations, Runge - Kutta methods for solving differential equations etc.
  We distributed the workload amongst ourselves, I had to create the parser, Anuj had to create the integration function(s), and Sanjana had to create the differentiation function.

- 21:00 - 23:30 12th October 2014
  I studied about methods of parsing and the two forms of parsed mathematical expressions:reverse Polish notation and the Abstract syntax tree. I decided to use the reverse Polish method for simplicity.I studied on how any given expression can be broken into tokens by Dijsktra's Shunting Yard algorithm and then the expression can be parsed.

- 21:00 - 22:00 13th October 2014
  I made a final call on the implementation of the Parser using classes as described in the project report. I implemented a prelimninary version of the get_token function in the Token class and math_parse function in the class Parser.

- 20:00 - 22:30 14th October 2014
  CS Lab Diary report was submitted. I fixed some bugs in the implementation of the math_parse function and decided that each valid expression would end with a semi-colon to make parsing easier.

- Team Meet 2 : 10:30 - 12:30 15th October 2014
  At our second meeting, we made a definite schedule for our work in the

following weeks, but also left some extra time to add on more features to our program.
We also talked about the Project Report and its format, and then wrote each of our parts as decided in Team Meet 1 of the project Report, where we explained our topic and the concept behind it.

- `18:00 - 19:30 15th October 2014`
  I continued working on the Parser class and added the keyword *define* in token type which would be used to define a function, variable, etc.I also decided to use map STL container to store the list of variables and functions

- `Team Meet 3 : 9:00 - 11:30 19th October 2014`
  The team meet was of 2.5 hours in which we discussed about the documentation needed for Stage 1 submission.
  We distributed the task writing the project report wherein I had to write about the Fast Fourier Transfrom, Anuj had write about the Root finder and Sanjana had to work on methods of solving simultaneous equations.

- `20:00 - 23:00 21st October 2014`
  I added a Routine class which will be used to handle routines such as differentiate,integrate,etc and it would store metadata about them.I added routine name parsing to program so that the user can execute the routines.

- `18:00 - 20:00 22nd October 2014`
  I integrated the differentiate routine which Sanjana provided into the parser.It seems to work fine as of now. I added support for unary minus in the program which erstwhile was absent.I had to create a new token_type in the parser for this support.Also the unary minus being a unary operator had to handled differently.

- `18:00 - 20:00 23rd October 2014`
  I added scientific notation support in the program by defining E to be an operator which mimics multiplication with appropriate base to the power.The showrpn keyword was also added to allow the user to see the rpn of the input.Error handling was done by defining a file errors.h and throwing exceptions of macros defined in this file.

- `18:00 - 20:00 24rd October 2014`
  Fixed bugs in routine name parsing and added ability to throw domain errors for wrong inputs on functions such as division and the factorial.

- `18:00 - 20:00 26rd October 2014`
  Fixed a bug in subtraction where any minus sign was treated as a unary minus which produced segmentation fault while parsing the expression.

- `18:00 - 19:00 28rd October 2014`
  Implemented the ability to define linspaces from one real number to another.I also added basic slicing for arrays based on the way it is implemented in numpy module in python.

- `18:00 - 20:00 30rd October 2014`
  Added ability to read and write ndArrays to files which probably would be the most useful feature of the program. I also implemented the evaluate keyword which allows the user to evaluate a one variable function on an entire ndArray.

- `18:00 - 20:00 16th November 2014`
  I studied the mpfr library and told my team-mates to do the same.Using this library,I define a Number class which had arbitary precision support.This class was used in the program instead of double values.As a result,now the user can perform operations to any desired level of accuracy and precision.

- `18:00 - 20:00 20th November 2014`
  I created a complex class for the fact fourier transform.The transform works fine though I do have some doubts in its implementation especially at the bit level operations.I also added constants from CODATA[1] 2010 database which could be relevant for scientific compuatation.

- `18:00 - 20:00 21th November 2014`
  Improved error support and added extra routines which Anuj and Sanjana had written.

- `18:00 - 20:00 23th November 2014`
  Added inverse fft and support for writing ndArrays as csv files.

- `17:30 - 19:00 24th November 2014`
  I added documentation and user manual for the code.The code was also reviwed for checking bugs and the progam was tested.

[1]CODATA http://www.codata.org/