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Summary of qualifications

- Completed MMath degree in **scientific computing** at the University of Waterloo.
- 10+ years of programming experience, primarily in **C++, Python and Fortran** additionally in **Matlab, Java**.
- Completed 13+ certified online courses in **machine learning, data science** and **deep learning**.
- Strong mathematical and statistical analysis skill with pure and applied mathematics background.
- 3+ years of working experience with different **machine learning** and **deep learning** model development and deployment.
- Currently developing code using dynamic memory allocation and the data structures are implemented using object-oriented feature of **C++.**
- Strong problem-solving experience in different competitive programming platform.
- Experienced in **algorithm design** and **data structures**.
- Experienced in algorithm design and implementation for a variety of **numerical methods and optimization problems.**
- 3+ years working experience in different data science libraries specially python **Scikit-learn, NumPy, Pandas, NLTK, TensorFlow, Keras** with the different visualization library such as **matplotlib, seaborn, plotly, cufflinks.**
- Demonstrated strong communication skills in the teaching assistant duty at the university courses.
- Proficient in both Linux and windows operating system.

Skills

Programming Languages: Python, C++, Fortran, Java, Matlab, HTML, CSS, JavaScript.
Data science and Machine learning libraries: Sklearn, numpy, pandas, NLTK, matplotlib, seaborn, plotly, cufflinks.
Deep learning Framework: Tensorflow, keras, OpenCV.
Databases: PostgreSQL, impala, hive, Spark.
Data-visualization tool: Tecplot, Tableau.
Tools : Git, Bash, Jupyter, Emacs.

Education

University of Waterloo
Waterloo, Ontario, Canada

M.Math in Applied Mathematics
Sep.2017-Jun.2020

- International Master's student Award
- Graduate Research Studentship
- Master's thesis completion award
- Bangladesh-Sweden Trust Fund Travel Scholarship

University of Dhaka
Dhaka, Bangladesh

M.Sc in Applied Mathematics
Feb.2016-Jul.2017

- National Science and Technology (NST) fellowship awarded by ministry of science and technology, Government of people's republic of Bangladesh.

University of Dhaka
Dhaka, Bangladesh

B.Sc(Hons.) in Mathematics
Jan.2011-Jan.2016

Experience

Code developer and Graduate Researcher
Department of Applied Mathematics, University of Waterloo, Ontario, Canada.
(September/2017- June/2020)

- Developing stable Adaptive Mesh Refinement (AMR) code (use multiple level of refinement) for stratified fluid model using the combination C++ and Fortran 90 with parallel programming to reduce computational expense.

- Developed one dimensional nonlinear and dispersive wave equation solver with Adaptive Mesh Refinement (AMR) using C++. Dynamic memory allocation was used during the computation. Hierarchical data structure used through C++ object-oriented feature. An algorithm included to identify the region required refinement with the advancement of time. The refinement is automatic and self-motivated. The code produced highly accurate solution as finest resolution single grid solution with better time efficiency.
- Working experience with hierarchical data structure for AMR grid generation

Compute Ontario Summer School on Scientific and High-Performance Computing
University of Toronto, Ontario, Canada
(June/2018)

- Learned programming clusters with MPI
- Familiar with GPUs programming with CUDA

Graduate Teaching Assistant
(September/2017-April/2020)
University of Waterloo, Ontario, Canada

- Lecturing tutorials for several courses and received good feedback from the student.

Projects_____

Visit Git-Hub page for the source code

❖ **Thesis and research projects on numerical solution of nonlinear and dispersive wave equations using Adaptive Mesh Refinement (AMR)** (**C++** code available upon request)

❖ **Simple 1-D wave equation solver (C++)**
Developed numerical solver for one dimensional wave equation with 1 level refinement code using C++ vector STL. The code starts computation with a very small number of grids then with time grids were added or removed based on some user defined criteria. Both the time and space complexity are reduced. The stability of the code maintained with constant CFL.

❖ **Nonlinear PDE solver using Moving Mesh technique (Matlab)**
Numerical Solution of nonlinear differential equation using MATLAB code to achieve highly accurate solution with reduced computational cost. The idea behind the optimization is to move the computational grid points where it requires more grid point. The moving grid algorithm was used for the implementation of the code. Several MATLAB built-in functions were used to reduce the complexity of the code.

❖ **Image Classification Model sing Real and CGI Images (Python)**
Developed an image classification model using a pretrained inceptionV3 model on top. Transfer learning is used to build the model. The model is trained with real images of cat and dog along with computer generated images of horse and human. However, the model can classify dog, cat, horse, human from any real image with high accuracy.

❖ **Financial Data Analysis and Stock Price Prediction (Python)**
Collected stock data from online using python library. Some exploratory data analysis has completed. Finally, developed stock price prediction model for a selected company using LSTM architecture. The model performance on unseen data was satisfactory.

❖ **Portfolio Website Development (HTML, CSS, JavaScript)**
Developed Interactive website using HTML, CSS, and JavaScript. This is a portfolio website which is hosted in GitHub repository.

❖ **Image Transform Project (C++)**
Create code for three different effects on a given image. In the first case the hue is changed to blue or orange which we called illinify effect. The second case we create a spotlight pattern based on given center and in the final case watermark was created on the given image.

❖ **Recommender System (Python)**
Developed a recommender system based on the movie dataset which can recommend 5 similar movies. The model developed using collaborative filtering. The key idea was to build a simple recommender system using the user rating and the similarity of the movies.

❖ **E-commerce Company App Budget Analysis (Python)**
Developed model to predict the best budget allocation of an ecommerce company for their mobile app and website development.

❖ **SMS Spam Filtering Model (Python)**
Developed SMS spam filtering using Naïve bayes, Bernoulii's Naïve Bayes and Random Forest classifier. The model can detect spam from the SMS with high accuracy.

❖ **Airbnb Housing Price Prediction (Python)**

Developed Airbnb house price prediction model using the deep neural network architecture. The model was trained on cleaned data (used explicit feature engineering) and that was fine-tuned by changing the hyperparameters of the deep neural network.

❖ **Lid-Driven Cavity Flow problem using Vanka's approach (FORTRAN)**
Developed Fortran 90 code for the Simulation of cavity flow problem using alternative algorithm. Two dimensional steady incompressible Navier-Stokes equation solved using vanka's approach for a lid-driven cavity. Some additional features were added for the implementation of other method.

❖ **Application of Triangular Fuzzy Number in Electrical Circuit System (Research project)**
Introduce some new terminology for the graphical visualization of fuzzy system. Applied fuzzification in the electric circuit system problem to find the fuzzy solution with the help of Matrix algebra which was compared with the crisp solution and finally established the validity of the solution graphically.

Online Specialization Certificate _____

- **Deep Learning Specialization** by deeplearning.ai by Coursera.
  - Neural Networks and Deep Learning
  - Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization
  - Structuring Machine Learning Projects
  - Convolutional Neural Networks
  - Sequence Models

- **Deep Learning.AI TensorFlow Developer Professional Certification** by deeplearning.ai by Coursera.
  - Introduction to Tensorflow for Artificial Intelligence, Machine Learningand Deep Learning
  - Convolutional Neural Networks in Tensorflow
  - Natural Language Processing in Tensorflow
  - Sequence, Time Series and Prediction

- **Object-Oriented Data Structure in C++** by University of Illinois at Urbana-Champaign by Coursera.
- **Analyzing Big Data with SQL** by Cloudera
- **Foundation for Big Data Analysis with SQL** by Cloudera

Research Interest _____

- **Deep Convolutional Generative Adversarial Network (DCGAN)**
- **Fuzzy Support Vector Machine**
- **Operation Research**
- **Numerical Solution of Partial differential equation**
- **Mathematical Finance**
- **Algorithms**