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RESEARCH INTEREST

– Computer Vision
– Artificial Intelligence
– Machine Learning Algorithms
– Data Structure & Algorithms

ACADEMIC RECORD

– 2015 BS-MS dual Degree in Mathematics & Scientific Computing, IIT Kanpur
– 2015 Intermediate ISC(Class 12^{th}) 94.25%
– 2015 High School ICSE(Class 10^{th}) 96.2%

KEY PROJECTS

Graduate Technical Intern for Computer Vision Profile
Internship done under Trimble Information Technology India Pvt. Lt (May '14 - July '14)

– Worked on Computer Vision based **real-world** projects.
– Given a measuring **Scale** in real environment, **readings** had to be found corresponding to a cross-wire. It had to work for 3 different types of scales.
– **OpenCV** library for Java was used and project was deployed as an Android App.
– Major divisions of project were: Noise Removal, Scale detection, Cross-wire detection, Finding readings, Verifying Readings and OCR for numbers
– Several mathematical optimizations were used to make the app work on **smart-phone** real-time.
– Worked on another side project based on **geometry** and **camera-calibration**

Blind Navigation App
Project under Prof. Vinay Namboodari, Dept. of Computer Science & Engineering, IIT Kanpur (Feb '14 - Apr '14)

– Android App was made using which a **Visually-impaired** person can **navigate** a **Indoor** Environment.
– **OpenCV** library for Java was used.
– App detected **direction** markers placed on floor and interpreted directions from it.
– App also detected the **obstacles** in front of user and thus guiding him/her in order to avoid **collision** with it.
– Implemented **pedometer** algorithm to count the number of steps that user has taken so that whenever user loses path, mobile may direct him/her to last recognized point.
– Appropriate Data Structures and **Optimization** algorithms were used in order to get **real- time** working prototype on **mobile** processor.

Android Apps for Special Children
Internship done under Svagatagami Association(NPO) under project name Abhilasha (July '13 - Nov '13)

– Worked as **Coordinator** of App Development team.
– Android Apps were developed for children with problems like mental retardation, **autism**, hyper-activity and Attention Deficit Disorder
– Apps were aimed at **teaching** them **Numbers**, improving their writing skills. Also a mosquito game was made for them
– Apps were tested on **Akash Tablet** with kids at Sankalp Day Care Center, Kanpur
– Apps won **1st** prize in **SoCha**, a social entrepreneurship competition of **E-Summit 13**, IIT Kanpur.

Connectomics
Project done under Prof. Amitabh Mukherjee, Dept. of Computer Science & Engineering, IIT Kanpur (Feb '14 - Apr '14)

– Project was based on a competition on **Kaggle**
– Connectivity in neural structures was predicted using techniques of **statistical causality**
– Data provided : **Time series** of neural activity through fluorescence imaging.
– Methods used were Cross-Correlation, Mutual Information, **Granger Causality**, **Generalized Transfer Entropy**, **Information Gain** and Combined Linear Model.
– Appropriate algorithms were used to tackle low-signal-to-noise ratio and collective synchrony in time series data

Research Crawler
Project done as a Winter Internship under a Startup (Dec '13)

– Project had 2 major components :
1. Making a script which would **crawl** the **web**, download the papers given the keyword and also convert it to text
2. Given set of papers, automatically discover appropriate number of **clusters** and then divide the papers using **Natural Language Processing**

– scikit, numpy, nltk, urlparse, urllib2, shutil, pylab, pickle modules of **python** were used
– Research papers were collected through crawling of Bing and **Spider-crawl**.
– Reference section of each research papers were recognized by the script. Papers and weblinks present there were recursively put for web-search using the script
– Algorithms used for NLP were TF-IDF, k-means and few others.
– **Bash** script was written to automate the complete code which consisted of several scripts

Connexion
App developed in Yahoo HackU-2013 ,IIT Kanpur (Oct '13)

– Implemented a Web-scraping based model in python in which given any two movie-personalities, it shows the **connections** between them in form of common movies, significant years or any other relation
– **dbpedia** and Wikipedia info-box were used to get the relation.
– The project was listed in **special** mentions in Yahoo HackU.

C++14 features
Project done under Prof. Rajeev Kumar, Dept. of Computer Science & Engineering, IIT Kanpur (Feb '14 - Apr '14)

– Features of C++14 were analysed and compared with their existing contemporaies in other language
– Three features were worked upon :
1. Polymorphic Allocators
2. Uniform initialization for arrays and class aggregate types
3. C++ pipelines

Cloud Pad
Project done under Electronics Club ,IIT Kanpur (May '12 - Jun '12)

– A **notepad** was designed. Whatever you type on sever machine was displayed on clients machine character-by-character. Aim was to mimic a **blackboard** used for teaching. And provide an electronic alternative for it.
– A real time game was designed using **UDP** protocol via Socket programming.
– Project also included a remote music player.
– The project was a package of above modules implemented using Python programming Language

Dropout Method for Neural Networks
Project done under Prof. Arnab Bhattacharya, Dept. of Computer Science and Engineering and Prof. Sharmishtha Mitra, Dept. of Mathematics and Statistics, IIT Kanpur (May '13 - Jun '13)

– Dropout method of randomly omitting hidden nodes to improve efficiency was examined
– The project was done in Matlab.
– Code was tested on data of handwritten digits

OTHER PROJECTS

• Electronic Calculator made on breadboard using basic **IC's** (4029, 555, 7447 etc) on **breadboard** which performed addition, subtraction and multiplication-division(by 2)
• Autonomous **wall following Robot** using IR sensors, PWM circuit along with motor drivers and Atmega8 as microprocessor
• Mathematical Modelling of Earth's Gravitational Field in Matlab using **EGM 2008** model
• Entire **animated** 3d model of Academic Affairs building of IIT Kanpur using 3ds-max
• **AI** based **Ping Pong Game** with two paddles and a ball made using pygame module of Python
• **AI** based implementation of **Carrom** game in Python using pygame module

TECHNICAL SKILLS

Programming Languages : C, C++, Java, Python, MPI(in C)
Tools : MATLAB ®, R-language, GNU Octave, LaTeX, HTML, CSS, Javascript, Jquery,AutoCAD ®, Autodesk 3ds Max ®, Code Vision AVR, AVR Studio ®, Android App Development, Asp.net

RELEVANT COURSES

- Computer Vision & Image Processing
- Applied Game Theory
- Probability & Statistics
- Computational Geometry [1]
- Theory of Computation [1]
- Abstract Algebra
- Mathematical Logic
- Introduction to Economics
- Ordinary Differential Equations
- Artificial Intelligence Programming
- Mathematics for Machine Learning
- Data Structure & Algorithms
- Time Series Analysis [1]
- Several Variable Calculus & Differential Geometry [1]
- Analysis I
- Sampling Theory
- Topics in Object Oriented Language Implementation
- Partial Differential Equations

[1] To be completed by Nov '14

Some relevant courses which I have done on online sites :

– *Coursera*: Machine Leaning (Standford University)
– *Coursera*: Image and video processing: From Mars to Hollywood with a stop at hospital (Duke University)
– *Coursera*: Introduction to Mathematical Thinking (Standford University)
– *Coursera*: Internet History, Technology and Security (University of Michigan)

SCHOLASTIC ACHIEVEMENTS

- Qualified **RMO** (Regional Mathematics Olympiad)in 2010(Class XI)and 2011(Class XII) with State Rank 13th and 5th respectively.
- Recepient of **KVPY** (Kishore Vaigyanik Protshahan Yojana) by Department of Science and Technology, India
- Won **First** Prize in FossDev in **Takneek 12** (Intra IIT-K technical fest) for designing a Brick Game in Python
- Won **First** Prize in **Ad-making** Competition in Sept 12 organised by Animation Club, IIT Kanpur
- Got $\mathbf{A}^*$ in *Data Structure & Algorithms* course for being among top 1% of the class

EXTRA-CURRICULAR ACTIVITIES

- Worked as **Head**, Web-development team of **POWER**, IIT Kanpur
- Worked as a **Secretary** of **Animation Club**, IIT Kanpur
- Presently **Green-1 belt** holder in **Taekwondo**
- **Coordinator** of Carrom in **Udghosh 12**, an Inter-Collegiate sports fest of IIT-Kanpur
- **Academic Mentor** in Counselling Service, IIT Kanpur for the year 2012-13