Amit Rajaraman

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Key Projects

2020 **Red Plag: Plagiarism Checker** *Guide: Prof. Amitabha Sanyal | IIT Bombay*

• Implemented a modified version of **latent semantic analysis** which calculates the cosine similarity between different vectors in the covariance matrix corresponding to the data
• Added further functionality for **reliable detection** if the program is written in C++, Python, or Java for ignoring language-specific syntax
• Built a user interface using **Angular** with a **Django** backend where registered users can upload and process files and view the similarities between the different pairs, visualised as a heat map

2020 **Tetris** *Self Project*

• Developed a complete playable version of the game **Tetris** in Python using the **PyGame** library
• Utilized the **seven-bag algorithm** to reduce flooding and drought of specific pieces
• Implemented an algorithm that analyses the current situation of the game, calculates the best possible move, and makes the appropriate decision to maximise the increase in score

Reading Projects

2020 **Coding Theory** *Summer of Science under Math and Physics Club, IIT Bombay*

Studied Coding Theory from *Essential Coding Theory* by Guruswami, Rudra, and Sudan
Became proficient in several topics, notably **linear codes**, **perfect codes**, numerous bounds on the volume of the **Hamming sphere**, and **Shannon's Theorem**

2020 **Topics in Algebra II Course Project**

Prepared a presentation on the **quiver of the Tits algebra** and the **Saliola lemma**

2020 **Probability Theory** *Self Project*

Studied probability theory and measure theory from *Probability Theory* by Achim Klenke
Learnt topics related to **branching processes**, the **laws of large numbers**, and **Markov chains**

2020 **Automata Theory** *Self Project*

Studied Automata Theory from *An Introduction to the Theory of Computation* by Michael Sipser
Covered topics such as **deterministic** and **pushdown automata**, **context-free grammars**, and examined some results related to the **Černý conjecture**

Education

2019 – 2021* **Indian Institute of Technology Bombay, India** 9.78 CPI
B.Tech. *Computer Science and Engineering*

2017 – 2019 **Sri Chaitanya Junior College, India** 97.80%
Intermediate/+2

2010 – 2017 **Delhi Public School, Hyderabad, India** 10.0 GPA
Matriculation

Scholastic Achievements

- 2019 Secured **All India Rank 12** in **JEE Advanced** among 245,000 aspirants
- 2019 Secured **All India Rank 102** in **JEE Main** among 1.2 million aspirants
- Awarded AP grade in
  - 2020 MA106 (**Linear Algebra**), awarded to 8 out of 1108 students
  - 2019 CS101 (**Computer Programming and Utilization**), awarded to 1 out of 1212 students
  - 2019 MA105 (**Calculus**), awarded to 35 out of 1137 students
  - 2019 PH107 (**Quantum Physics and Application**), awarded to 12 out of 1115 students
- 2019 Secured **All India Rank 2** in the admission test to **Indian Statistical Institute, Kolkata**
- 2019 Scored **415/450** in **BITSAT** (Birla Institute of Technology and Science Admission Test)

Scholarships and Recognition

- 2017 Recipient of the prestigious **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship
- 2019 Amongst the **top 300** students across the nation in **NSEC** and appeared for the **INChO**
- 2019 Amongst the **top 300** students across the nation in **NSEA** and appeared for the **INAO**
- 2016 Attended a camp in Delhi for securing **All India Rank 33** in the **DPS Talent Examination**

Technical Skills

- Programming: C++, Python, Julia, C, Bash, Java, C#
- Web Development: HTML5, CSS, JavaScript, AngularJS, PHP, Django
- Software: MATLAB, Git, LaTeX, Android Studio, Doxygen, SOLIDWORKS, Unity, Quartus

Select Courses Undertaken

- Computer Science: Data Structures and Algorithms, Design and Analysis of Algorithms*, Discrete Structures, Logic for Computer Science*, Computer Programming and Utilization, Data Analysis and Interpretation, Computer Networks*
- Mathematics: Topics in Algebra II, Real Analysis, Topology*, Calculus, Linear Algebra

Miscellaneous

- 2020 **Teaching Assistant, MA 109 (Calculus I)** *Instructor: Prof. Ravi Raghunathan | IIT Bombay*
  Responsible for conducting tutorial sessions for a batch of **45 students** throughout the semester, helping them clear conceptual doubts through personal interaction, and correcting answer sheets
- **Mathematics StackExchange**
  Have garnered over **2200 reputation** on Math StackExchange and reached over **7000** people

Extracurriculars

- 2019 Successfully completed a year-long course under **NSO** in **Table Tennis** in the freshman year
- 2019 Engineered an **app-controlled bot** as a part of XLR8 competition organized by ERC, IIT Bombay
- 2020 Secured **first position** in the Bamboozled competition conducted by MnP Club, IIT Bombay
- 2019 Secured **second position** in the Bazinga! Physics competition conducted by MnP Club, IIT Bombay