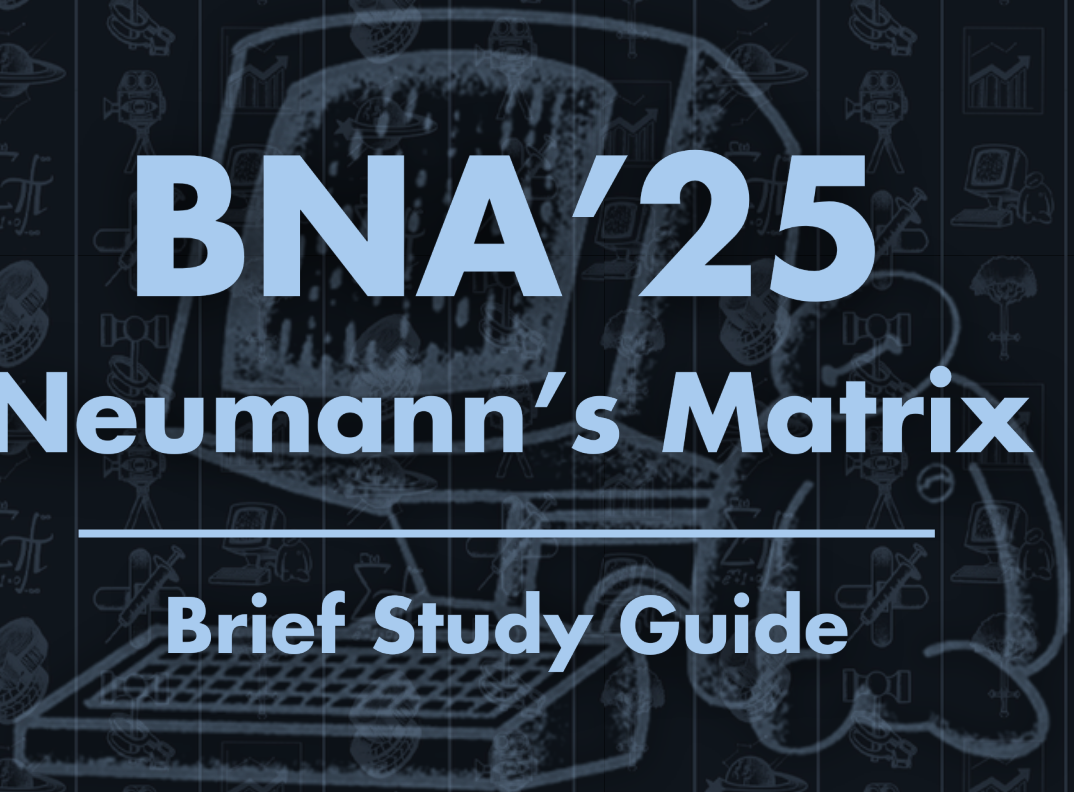
BNA'25

Neumann's Matrix



Brief Study Guide

Neumann's Matrix

"Neumann's Matrix" is the computer science module at Beaconhouse Notion of Academia '25, designed to ignite a passion for technology and innovation among delegates. Teams will tackle coding challenges, experiment with image manipulation, explore data visualization, and apply machine learning to solve real-world problems. This dynamic module fosters creativity, collaboration, and competition, allowing delegates to unlock the potential of computer science while working with like-minded peers.

Round

1

The first round, titled **"YOLO (You Only Look Once)"**, invites delegates into the cerebral world of image manipulation, machine learning, and data visualization. Teams will be given images with subtle distortions, such as misaligned objects or color shifts, and must use image manipulation techniques to detect and correct these flaws. They will then train an object detection model to identify a given object, which will then be tested on new images for effectiveness. Next, delegates will apply data visualization techniques to interpret patterns in Jupyter Notebook datasets and answer a set of questions based on their findings, testing their ability to draw insights from complex data.

Delegate Cap: 2 per team

2

The second round, titled **"Codeception"**, propels delegates into the heart of the coding arena, wherein

their problem-solving abilities, creativity, and precision are put to the ultimate test. Teams will face a series of coding challenges on the DOMJ platform, designed to test their understanding of algorithms, data structures, and programming concepts. As they progress through varying levels of difficulty, delegates will be tested on different programming paradigms and will have to write efficient and accurate code that conforms to demonstrated requirements of time and space complexity. To add to the pressure, teams will be able to view a live leaderboard. Success depends on critical thinking, debugging, and flawless execution.

Delegate Cap: 3 per team

3

The third round, titled **"Error 403"**, challenges delegates to participate in an exhilarating and captivating world of cybersecurity in a competitive showdown. Teams will don their digital armour and employ specified software and password dictionaries to break through the barriers of a virtual server, attempting to gain access via SSH. Once inside, the challenge intensifies as they navigate the intricate layers of cybersecurity, using powerful bash scripts to unravel complex AES and RSA encryption problems. Each step requires technical finesse and a hacker's ingenuity to decrypt secrets hidden within the virtual machine.

Delegate Cap: 4 per team

Note: The information in this document is subject to changes.