MIDAS (Mohan Lab Image and Data Analytics Scholarship)

Code War - Image Analytics

Eligibility: First-Year Master's students from Computer Science, Data Science, Engineering with proficiency in R, Python, MATLAB (optional) and with image analysis platforms like ImageJ and QuPath.
Event Details: September 6, 2025, 9:00 AM – 12:00 noon; **Venue**: CBB 104
Interested candidates should register using this link: Registration Link by 2 SEPT 2025.

Round 1 – Candidates will be provided with .TIFF images with expression levels of several protein in separate layers. Code war will feature a series of tasks which will test familiarity with the following:

Image processing - background / noise reduction, stray / hot pixel removal.
Segmentation models- DAPI based cell detection, segmentation using membrane staining
Cell counts, measuring overlaps between channels, watershed algorithm
Neighborhood Analysis – Finding areas with enriched cell populations.
Identification of structural features in kidney (glomerulus, tubules, blood vessels)
Calculating distances between detected cells and between cells and structural features.
Data Presentation – Heatmaps, correlation plots, cell network plots, data normalization, data scaling

Candidates will input quantified numbers into the provided excel file template. The data must also be represented using figures in a ppt file. The codes used for the calculation must be submitted for review.

Progression criteria - Accuracy of the quantified data (compared to our internal metrics within 10% tolerance) and data presentation skills (do the generated figures accurately depict the findings).

Round 2: Top 5 candidates will present their code in an in-person interview, to review their code, assess programming logic, other possible methodologies and data interpretation.

Rules & Regulations

- **No external assistance** is allowed: no mobiles, books, Google, AI tools, or personal notes.
- We will use a Lockdown Browser to restrict access to any other tabs, software, or websites.
- Participants must carry their **valid student ID** for verification.
- Any form of malpractice will lead to **immediate disqualification**.

Final selected candidates will be awarded the **MIDAS Scholarship** — valued at **$12,000,** disbursed as $1500 monthly stipends over 2 semesters (contingent on satisfactory progress).

Spatial OMICs Research in Mohan Lab: Mohan lab has conducted spatial transcriptomics, proteomics and metabolomics on kidney slides and integrating these different spatial modalities allow for identification of molecular pathways and interaction which can then be correlated with pathological evaluation to identify the key interactions occurring during disease pathogenesis. Ideally, the selected individuals will also work on integrating the image analysis with other OMICs datasets and also with bulk proteomics / transcriptomics.
