**Draft Report – Week 2**

**Project Title:** CHANAKYA UNIVERSITY – *Campus Navigator & Question Answering Chat-bot*  
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**University:** Chanakya University

**1. Introduction**

During Week 2, the focus shifted from defining the conceptual graph to building a detailed digital graph of the university campus using **Python (NetworkX + Matplotlib)**. The objective was to model major campus landmarks, establish realistic connectivity between them, and generate a preliminary visualization of the campus graph. This ensures that the graph structure aligns with real-world navigation and can be used for future autonomous navigation simulations.

**2. Methodology**

**2.1 Graph Construction**

* Defined key **landmarks (nodes):** Main Gate, Admin Block, Library (inside Admin), Engineering Block, Food Court, Football Court, Circular Academic Zone, Hostel Road, and Hostel Blocks (1–5).
* Established **edges (paths)** with descriptive labels such as *Entry Path, Internal Path, Academic Path, Hostel Path*, etc. to reflect realistic navigation routes.

**2.2 Graph Visualization**

* Implemented the graph using **NetworkX** for node-edge modeling.
* Used **Matplotlib** to draw the campus layout.
* Designed a **structured layout** where the Admin Block is central, with hostels placed on the far-right side, and recreational areas (Food Court, Football Court) aligned below.
* Customized visualization with labeled nodes, highlighted edges, and annotated path labels for readability.

**2.3 Validation**

* Extracted landmark coordinates from **Google Maps API** for accuracy.
* Cross-checked these with ground-truth campus references.
* Ensured each defined edge corresponds to an actual path within Chanakya University.

**3. Results**

**3.1 Connectivity Check**

* All major landmarks are reachable from the **Main Gate**.
* No isolated subgraphs were detected, confirming proper connectivity.

**3.2 Visualization**

* Generated a **preliminary campus map** (see Figure 1) with nodes and edges clearly represented.
* Edge labels (e.g., *Entry Path, Hostel Path*) indicate the type of connection.
* Hostel blocks were neatly aligned along the **Hostel Road**, matching the real-world design.

**3.3 Path Examples**

* **Main Gate → Hostel Block 3**  
  Path: Main Gate → Admin Block → Circular Academic Zone → Hostel Road → Hostel Block 3
* **Admin Block → Food Court**  
  Path: Admin Block → Engineering Block → Food Court
* **Food Court → Football Court**  
  Path: Food Court → Football Court

**4. Challenges**

* Designing a clear **layout** was difficult due to clustering of hostel nodes.
* **Edge labels** overlapped when too many connections passed through Admin Block.
* Visualization requires refinement to reflect **scaled geographic distances** instead of approximate placements.
* Integrating the **Google Maps API** for accurate coordinate retrieval required handling API key management, rate limits, and precision mismatches.
* Initial development of the **Campus Navigator Chat-bot** required connecting the graph model to a natural language interface, which introduced challenges in understanding user queries and generating accurate responses.

**5. Week 2 Deliverables**

* Constructed the **digital campus graph** using NetworkX.
* Defined **13 nodes** and their realistic connections.
* Added descriptive **path labels** to edges.
* Generated the first **visual graph layout** using Matplotlib.
* Documented methodology, results, and challenges for refinement.

**Appendix A – Graph Visualization**

* **Figure 1:** University Campus Graph (Generated with NetworkX + Matplotlib)  
  *(PNG output stored in project files)*