

COM618 – Data Science – Lab Activities

Week 1 Practical Lab Activities

Tools Required: Python (Jupyter Notebook or Google Colab), Excel, Internet Access, Miro or Jamboard, Presentation Software

Lab 2: Big Data in Action – The 5 V's Challenge

Objective: To explore the five dimensions of Big Data—Volume, Velocity, Variety, Veracity, and Value—through sector-specific case studies.

Group Setup: Divide students into groups. Each group is assigned a different sector:

- **Group A:** Healthcare
- **Group B:** Retail and E-commerce
- **Group C:** Transport and Smart Cities

Tasks:

1. **Research & Identify Examples**
 - Find real-world examples of each of the 5 V's within your assigned sector.
 - Use online datasets (e.g., NHS, Kaggle, Transport for London) to support your findings.
2. **Create a Sector Infographic**
 - Design a one-slide infographic summarising your examples.
 - Include brief definitions and visuals for each V.
3. **Present Your Findings**
 - Each group presents their infographic to the class (5 minutes per group).
 - Highlight how Big Data is transforming your sector.

Expected Outcomes:

- Clear understanding of the 5 V's of Big Data
- Ability to apply theoretical concepts to real-world contexts
- Improved presentation and teamwork skills

Lab 3: Role Play – Build Your Data Science Team

Objective: To understand the interdisciplinary roles within a data science project and simulate collaborative planning.

Group Setup: Divide students into three project teams. Each team will role-play the following positions:

- **Data Engineer**
- **Data Scientist**

- **Data Analyst**
- **Domain Expert**

Scenario: Your team is tasked with designing a data-driven solution to **optimise energy usage in smart homes**.

Tasks:

1. **Define Role Responsibilities**
 - Each member outlines their role's contribution to the project.
 - Discuss tools, skills, and data requirements.
2. **Draft a Mini Project Plan**
 - Identify the data sources (e.g., smart meter readings, weather data).
 - Choose appropriate tools (e.g., Python, SQL, Power BI).
 - Outline the workflow: data collection → cleaning → analysis → reporting.
3. **Visualise the Workflow**
 - Use Miro or Jamboard to create a visual map of your team's process.
 - Include timelines, dependencies, and expected outcomes.
4. **Team Reflection**
 - Briefly discuss challenges and how cross-functional collaboration improves outcomes.

Expected Outcomes:

- Deeper understanding of data science roles
- Practical planning and workflow mapping
- Enhanced communication and project design skills

Lab 5: Mini Case Study – Data Science in Daily Life

Objective: To connect data science principles to everyday experiences and reflect on their impact.

Group Setup: Divide students into three groups. Each group selects a different everyday application:

- **Group A:** Streaming services (e.g., Netflix, Spotify)
- **Group B:** Online shopping and recommendation engines
- **Group C:** Fitness tracking and wearable tech

Tasks:

1. **Map the Data Journey**
 - Identify how data is collected, cleaned, analysed, and used to make decisions.
 - Highlight user interactions and feedback loops.

2. Identify Roles and Tools

- Determine which data science roles are involved.
- List tools and technologies used (e.g., machine learning models, cloud platforms).

3. Create a Case Study Slide

- Summarise your findings in a one-slide case study.
- Include diagrams or flowcharts to illustrate the data journey.

4. Group Reflection

- Discuss how data science improves the user experience.
- Consider ethical implications (e.g., privacy, bias).

Expected Outcomes:

- Ability to relate data science to real-world applications
- Improved analytical and storytelling skills
- Awareness of ethical considerations in data use