Asian Institute of Technology
School of Engineering and Technology
Department of ICT

AT84.02: Business Intelligence and Analytics January 2025

ASSIGNMENT 2
Multi Criteria Decision Making

Due: 3 April 2025

In everyday decision-making, people often rely on intuition or gut feelings. However, when making critical decisions involving significant investments or long-term impacts, a structured and analytical approach is essential.

Multi-Criteria Decision Making (MCDM) is a sub-discipline of operations research that provides systematic methods for evaluating and ranking alternatives based on multiple, often conflicting, criteria. Various MCDM techniques assist in making data-driven decisions, including:

- Analytical Hierarchy Process (AHP)
- Weighted Sum Method (WSM)
- Weighted Product Method (WPM)
- Technique for Order Preference by Similarity to the Ideal Solution (TOPSIS)
- Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE).

Objectives:

This assignment aims to help you:

1. Understand Decision Matrices – Learn how to apply multiple weighted criteria for structured decision-making.
2. Perform Calculations & Justify Rankings – Analyze and interpret MCDM results.
3. Identify & Evaluate Key Criteria – Develop an understanding of relevant factors in decision- making scenarios.
4. Conduct Sensitivity Analysis – Test the stability of decision outcomes by adjusting criteria weights.
5. Provide Data-Driven Recommendations – Make informed conclusions based on a structured evaluation process.

Task:

The assignment is to build a small system (with a decision model) for ONE selected (out of 3) scenario. For each scenario, assume that there are 5 choices to select. For example, for scenario 2, it means that there are 5 job offers to choose from.

Scenario 1: Selecting the best **laptop** for a DSAI student.
Scenario 2: Evaluating **job** offers to determine the most suitable career opportunity.
Scenario 3: Selecting the best **location** for a new convenience store.

Your system should systematically evaluate alternatives based on relevant criteria and justify the final selection.

Assignment Requirements

1. Scenario & Criteria Selection
   - Choose one of the three scenarios.
   - Identify appropriate criteria and sub-criteria for decision-making.
   - Justify your selection of criteria with logical reasoning.

2. Alternative Identification
   - Define six choices for the selected scenario.
   - Ensure the choices are realistic and well-differentiated.

3. Decision Model Implementation
   - Use any open-source MCDM software of your choice to evaluate the options.
   - Construct a decision matrix based on the selected criteria and alternatives.

4. Weight Distribution & Testing
   - Assign weights to each criterion based on importance.
   - Justify the weight distribution using appropriate reasoning.
   - Run your system to determine the best alternative.

5. Sensitivity Analysis
   - Conduct a sensitivity analysis to evaluate how changes in weights affect the decision outcome.
   - Discuss the robustness of your decision-making model.

6. Report Submission
   - Prepare a comprehensive report documenting:
   - The decision-making process
   - The criteria and weight selection
   - Results and rankings
   - Insights from the sensitivity analysis
   - The final recommendation

Submission Guidelines

1. File Format: Submit a PDF file.
2. File Naming: Name your assignment as BIA_Assignment2_YourName.
3. Submission Method: Upload your report to Google Classroom.
