

22/02/2025

Profiles
assignment -
GITHUB project
- By Abdel
YEZZA (Ph. D) -
2025

Summary

Table des matières

Summary.....	1
Figures	1
MCAP - Profile-Activity Matching System 	1
🎯 Key Features	2
🔧 Installation.....	3
📦 Dependencies.....	3
🚀 Usage	3
Command-Line Interface	3
📄 Command Line Arguments (Console case).....	4
📄 Input File Formats.....	4
📄 Web application.....	6
1. Backend.....	6
2. Frontend.....	6
📄 Streamlit demo application.....	9
📁 Project Structure	12

Figures

1. Figure 1 Web output_1	6
2. Figure 1 Web output_2	7
3. Figure 1 Web output_3	7
4. Figure 1 Web output_4	8
5. Figure 1 Streamlit output_1	10
6. Figure 1 Streamlit output_2.....	11

MCAP - Profile-Activity Matching System

License  python 

A Python package designed for optimal profile-to-activity assignment based on skills matching, developed by Abdel YEZZA (Ph.D). This solution employs advanced

algorithms to maximize the correspondence between required activity competencies and available profile skills.

It is designed to provide a comprehensive solution for profile-activity matching, offering multiple models, flexible scaling options, complete web application, streamlit web interface, a robust logging system, a detailed validation of input data, and customizable processing of MCAP functions (sum, mean, Euclidean and any custom function).

This project is built on the two following non-technical articles:

1. [UN NOUVEAU MODELE POUR AFFECTER LES PROFILS ADEQUATS](#) - by Abdel YEZZA (Ph.D) - 2024
2. [UNE NOUVELLE FAÇON D'AFFECTATION DES PROFILS AUX ACTIVITES](#) - by Abdel YEZZA (Ph.D) - 2022

Key Features

- **Skills Matrix Analysis:** Process and analyze competency-activity (MCA) and competency-profile (MCP) matrices
- **Multiple Model Support:** Five different matching models available (model1 through model5 or any custom function)
- **Flexible Scaling:** Support for different scale types (0-1, free)
- **Web Interface:** Built-in web application using FastAPI and Streamlit
- **Detailed Logging:** Comprehensive logging system for tracking operations
- **Data Validation:** Robust input validation and error handling
- **Customizable Processing:** Support for different MCAP functions (sum, mean, euclidean and any custom function)

🛠 Installation

1. Clone the repository:

```
|| git clone [repository-url]  
|| cd profiles_assignment
```

2. Create and activate a virtual environment (recommended):

```
|| # install venv on Linux/MacOS:  
|| python -m venv venv  
|| source venv/bin/activate  
|| # to activate on Windows:  
|| venv\Scripts\activate  
|| Install dependencies:  
|| pip install -r requirements.txt
```

📦 Dependencies

- streamlit >= 1.24.0
- pandas >= 1.5.0
- scikit-learn
- matplotlib
- fastapi >= 0.104.0
- uvicorn >= 0.24.0
- python-dotenv >= 1.0.0
- python-multipart >= 0.0.6
- sqlalchemy >= 2.0.23

🚀 Usage

Command-Line Interface

Basic usage:

```
|| python main.py
```

Advanced usage with custom parameters:

```
|| python main.py --mca path/to/mca.csv --mcp path/to/mcp.csv --model  
|| model_name --scale scale_type --mcap mcap_function
```

Example:

```
|| python main.py --mca .\data\input\mca.csv --mcp .\data\input\mcp.csv --  
|| model models5 --scale 0-1 --mcap sqrt
```

Command Line Arguments (Console case)

- --mca: Path to the MCA (Matrix Competency-Activity) file
- --mcp: Path to the MCP (Matrix Competency-Profile) file
- --model: Model selection (model1, model2, model3, model4, model5 or your own model function)
- --scale: Scale type (0-1 or free)
- --mcap: MCAP function type (sum, mean, sqrt or a custom MCAP function)

Input File Formats

MCA (Competency-Activity Matrix)

```
Activity,Comp1,Comp2,Comp3
Activity1,0.8,0.6,0.7
Activity2,0.5,0.9,0.4
```

MCP (Competency-Profile Matrix)

```
Profile,Comp1,Comp2,Comp3
Profile1,0.7,0.8,0.6
Profile2,0.9,0.5,0.8
```

Running the previous example

```
python main.py --mca .\data\input\mca.csv --mcp .\data\input\mcp.csv --
model model5 --scale 0-1 --mcap sqrt
```

should have an **output** log like the following:

```
2025-02-22 11:51:32 - myLogger - INFO - Starting command-line processing
2025-02-22 11:51:32 - myLogger - INFO - Processing with parameters:
2025-02-22 11:51:32 - myLogger - INFO - - Model: model5
2025-02-22 11:51:32 - myLogger - INFO - - Scale: 0-1
2025-02-22 11:51:32 - myLogger - INFO - - MCAP: sqrt

...
2025-02-22 11:51:32 - myLogger - INFO - Initialized processor with parameters:
2025-02-22 11:51:32 - myLogger - INFO - - mca_matrix shape: (10, 10)
2025-02-22 11:51:32 - myLogger - INFO - - mcp_matrix:          Comp1  Comp2  Comp3
Comp4  Comp5  Comp6  Comp7  Comp8  Comp9  Comp10
Profile
Prof1    0.9    0.5    0.3    0.8    0.6    0.7    0.4    0.8    0.5    0.6
Prof2    0.4    0.8    0.6    0.5    0.7    0.9    0.3    0.7    0.4    0.8
Prof3    0.6    0.4    0.9    0.7    0.5    0.8    0.6    0.4    0.9    0.3
Prof4    0.8    0.7    0.4    0.9    0.3    0.6    0.8    0.5    0.7    0.4
Prof5    0.5    0.9    0.7    0.4    0.8    0.3    0.7    0.6    0.8    0.5
Prof6    0.7    0.3    0.8    0.6    0.4    0.9    0.5    0.7    0.3    0.8
Prof7    0.9    0.6    0.5    0.8    0.7    0.4    0.9    0.3    0.6    0.7
Prof8    0.3    0.8    0.7    0.5    0.9    0.6    0.4    0.8    0.5    0.9
Prof9    0.8    0.4    0.9    0.3    0.6    0.7    0.5    0.9    0.4    0.6
Prof10   0.6    0.9    0.4    0.7    0.5    0.8    0.3    0.6    0.8    0.5
2025-02-22 11:51:32 - myLogger - INFO - - mcp_matrix shape: (15, 10)
```

Profiles assignment - GITHUB project - By Abdel YEZZA (Ph. D) – 2025

```

2025-02-22 11:51:32 - myLogger - INFO -- mcp_matrix:
Comp4 Comp5 Comp6 Comp7 Comp8 Comp9 Comp10          Comp1  Comp2  Comp3
Profile
Prof1   0.9   0.5   0.3   0.8   0.6   0.7   0.4   0.8   0.5   0.6
Prof2   0.4   0.8   0.6   0.5   0.7   0.9   0.3   0.7   0.4   0.8
Prof3   0.6   0.4   0.9   0.7   0.5   0.8   0.6   0.4   0.9   0.3
Prof4   0.8   0.7   0.4   0.9   0.3   0.6   0.8   0.5   0.7   0.4
Prof5   0.5   0.9   0.7   0.4   0.8   0.3   0.7   0.6   0.8   0.5
Prof6   0.7   0.3   0.8   0.6   0.4   0.9   0.5   0.7   0.3   0.8
Prof7   0.9   0.6   0.5   0.8   0.7   0.4   0.9   0.3   0.6   0.7
Prof8   0.3   0.8   0.7   0.5   0.9   0.6   0.4   0.8   0.5   0.9
Prof9   0.8   0.4   0.9   0.3   0.6   0.7   0.5   0.9   0.4   0.6
Prof10  0.6   0.9   0.4   0.7   0.5   0.8   0.3   0.6   0.8   0.5
...
2025-02-22 11:51:32 - myLogger - INFO - MCAP matrix sample:
Profile      Prof1     Prof2     Prof3     Prof4     Prof5     Prof6     Prof7     Prof8
Prof9     Prof10    Prof11    Prof12    Prof13    Prof14    Prof15
Activity
Act1    1.844135  1.804701  1.851501  1.836739  1.767138  1.784657  1.865625  1.861451
1.797143 1.863017  1.871348  1.790639  1.831438  1.908897  1.850976
Act2    1.752379  1.800540  1.668249  1.757919  1.821477  1.703428  1.911079  1.934339
1.726670 1.745709  1.823077  1.809159  1.858987  1.711400  1.805393
Act3    1.688935  1.663413  1.819722  1.775372  1.822392  1.721434  1.921082  1.820256
1.780839 1.668083  1.849399  1.851501  1.750000  1.802005  1.835151
Act4    1.843005  1.838780  1.799228  1.851426  1.779123  1.815902  1.870754  1.915942
1.802467 1.852476  1.867113  1.789475  1.923538  1.842477  1.840365
Act5    1.781853  1.754360  1.875426  1.790562  1.849850  1.790019  1.965042  1.888341
1.844060 1.758787  1.922527  1.878534  1.781853  1.923033  1.911878
Act6    1.820256  1.897659  1.782476  1.777014  1.772083  1.853600  1.854649  1.984313
1.821324 1.829845  1.897659  1.772631  1.935200  1.832500  1.874463
Act7    1.698283  1.697138  1.828402  1.754597  1.843758  1.733974  1.892676  1.838478
1.837949 1.684488  1.864210  1.878755  1.735655  1.797838  1.846919
Act8    1.809926  1.893923  1.748730  1.776310  1.777951  1.814754  1.834999  1.974842
1.801311 1.822773  1.875352  1.781775  1.922455  1.776857  1.848723
Act9    1.709532  1.704976  1.810080  1.725382  1.831969  1.711237  1.902776  1.867708
1.790639 1.688935  1.830376  1.860929  1.729884  1.811690  1.815978
Act10   1.776232  1.771848  1.809850  1.861749  1.806085  1.697302  1.880972  1.854948
1.696729 1.850225  1.833333  1.764149  1.831211  1.817889  1.815749
2025-02-22 11:51:32 - myLogger - INFO - Ranking matrix generated successfully
2025-02-22 11:51:32 - myLogger - INFO - MCAP matrix shape: (10, 3)
2025-02-22 11:51:32 - myLogger - INFO - MCAP matrix sample:
                    Top1        Top2        Top3
Activity
Act1    Prof14 (1.909)  Prof11 (1.871)  Prof7 (1.866)
Act2    Prof8 (1.934)   Prof7 (1.911)  Prof13 (1.859)
Act3    Prof7 (1.921)   Prof12 (1.852)  Prof11 (1.849)
Act4    Prof13 (1.924)  Prof8 (1.916)   Prof7 (1.871)
Act5    Prof7 (1.965)   Prof14 (1.923)  Prof11 (1.923)
Act6    Prof8 (1.984)   Prof13 (1.935)  Prof2 (1.898)
Act7    Prof7 (1.893)   Prof12 (1.879)  Prof11 (1.864)
Act8    Prof8 (1.975)   Prof13 (1.922)  Prof2 (1.894)
Act9    Prof7 (1.903)   Prof8 (1.868)   Prof12 (1.861)
Act10   Prof7 (1.881)   Prof4 (1.862)   Prof8 (1.855)
...
2025-02-22 11:51:32 - myLogger - INFO - Ranking matrix saved to:
data\output\ranking_matrix.csv
2025-02-22 11:51:32 - myLogger - INFO - Ranking matrix saved to:
data\output\ranking_matrix.csv
2025-02-22 11:51:33 - myLogger - INFO - Matrice MCAP sauvegard e dans:
data\output\mcap_matrix.txt
2025-02-22 11:51:33 - myLogger - INFO - Matrice MCAP sauvegard e dans:
data\output\mcap_matrix.txt
2025-02-22 11:51:33 - myLogger - INFO - MCAP matrix saved to: data\output\mcap_matrix.csv
2025-02-22 11:51:41 - myLogger - INFO - Traitement termin  avec succ s

```

Web application

1. Backend

```
# go to backend folder  
cd web/backend  
  
# Install dépendances if any  
pip install -r requirements.txt  
  
# Run the serveur with uvicorn  
uvicorn main:app --reload --log-level debug
```

2. Frontend

```
# go to frontend folder  
cd web/frontend  
  
# Install dépendances if any  
npm install  
  
# Run the dev server  
npm start
```

You should get a message like:

You can now view mcap-frontend in the browser.

```
Local: http://localhost:3001  
On Your Network: http://192.168.1.19:3001
```

The web main interface looks like this:

The screenshot shows a web application titled "Affectation des Profils". The main page is titled "Configuration" and contains the following fields:

- Two buttons: "MCA_01.CSV" and "MCP_01.CSV".
- A dropdown menu labeled "Modèle" with the option "Modèle 5 (moyenne pondérée)" selected.
- A dropdown menu labeled "Type d'échelle" with the option "Échelle [0,1]" selected.
- A dropdown menu labeled "Fonction MCAP" with the option "Racine carrée" selected.
- A blue button at the bottom labeled "CALCULER LA MATRICE MCAP".

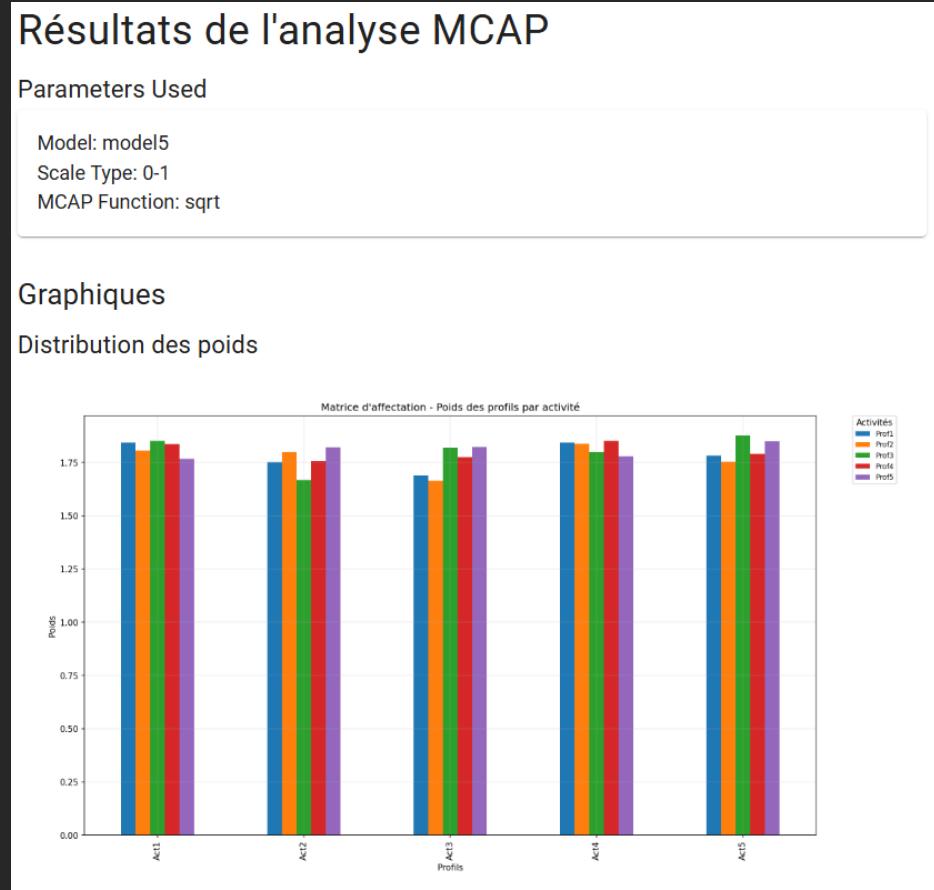
1. Figure 1 Web output_1

Depending on made options and input CSV matrices (mca and mcp), results look like this:

Classement des profils par activité			
Activity	Top 1	Top 2	Top 3
Act1	Prof3 (1.852)	Prof1 (1.844)	Prof4 (1.837)
Act2	Prof5 (1.821)	Prof2 (1.801)	Prof4 (1.758)
Act3	Prof5 (1.822)	Prof3 (1.820)	Prof4 (1.775)
Act4	Prof4 (1.851)	Prof1 (1.843)	Prof2 (1.839)
Act5	Prof3 (1.875)	Prof5 (1.850)	Prof4 (1.791)

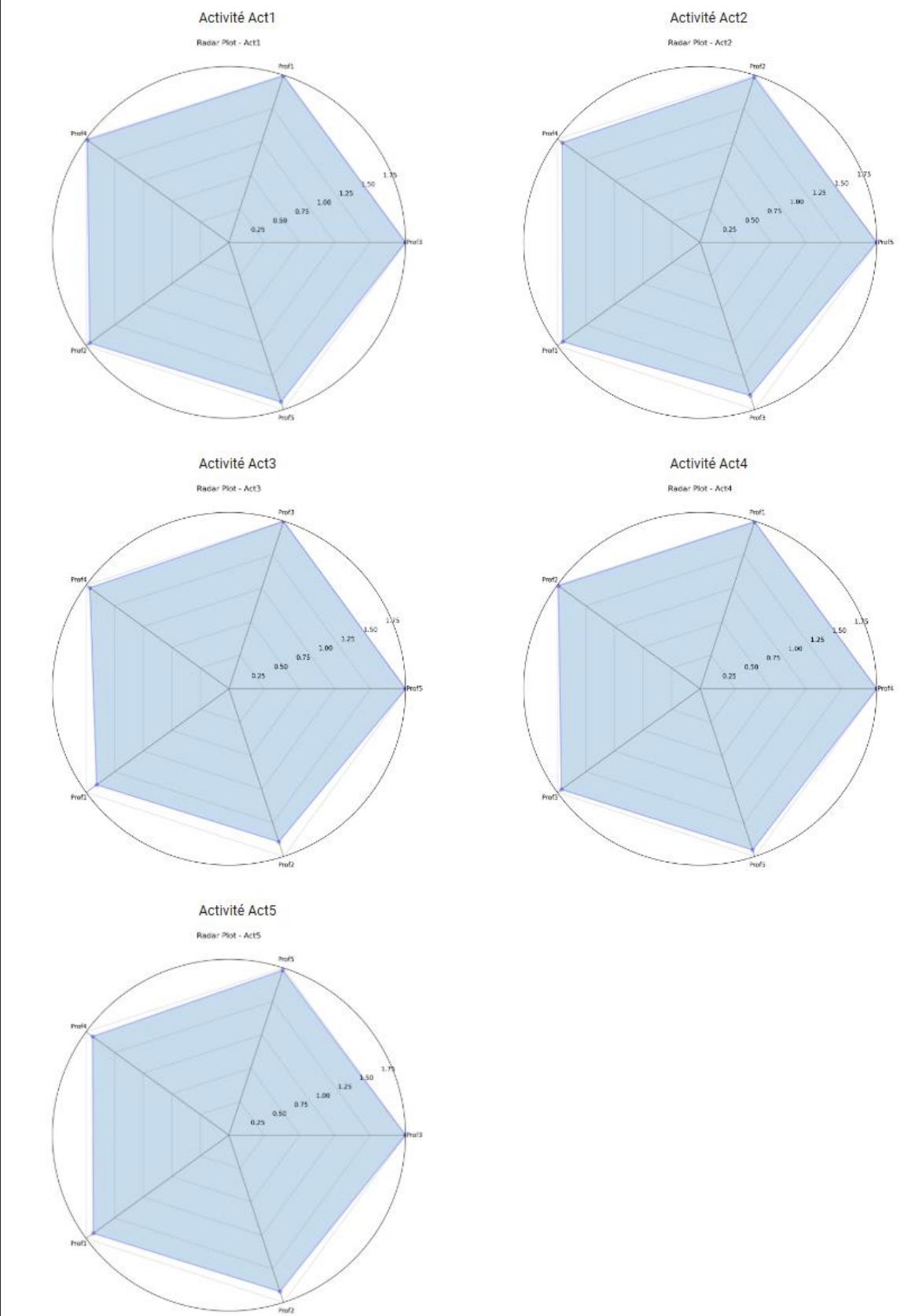
Matrice des résultats détaillée					
Activity	Prof1	Prof2	Prof3	Prof4	Prof5
Act1	1.844	1.805	1.852	1.837	1.767
Act2	1.752	1.801	1.668	1.758	1.821
Act3	1.689	1.663	1.820	1.775	1.822
Act4	1.843	1.839	1.799	1.851	1.779
Act5	1.782	1.754	1.875	1.791	1.850

2. Figure 2 Web output_2



3. Figure 3 Web output_3

Graphiques radar par activité



4. Figure 4 Web output_4

Streamlit demo application

streamlit.cmd run .\src\streamlit\app.py

You should have three menu items:

- Start page
- Test application
- Interactive application

Testing panel is equivalent to the WEB application and looks like this:

Navigation

Page d'accueil
 Tester l'application
 Saisie manuelle

Configuration

Charger le fichier MCA :

Drag and drop file here
Limit 200MB per file • CSV

[Browse files](#)

 mca_01.csv
300.0B ×

Charger le fichier MCP :

Drag and drop file here
Limit 200MB per file • CSV

[Browse files](#)

 mcp_01.csv
304.0B ×

Choisir le modèle

Modèle 5 ▼

Type d'échelle

- **0-1** : Les données doivent déjà être normalisées entre 0 et 1
- **free** : Les données seront automatiquement normalisées

Type d'échelle : ?

0-1 ▼

Choisir la fonction MCAP :

Racine carrée ▼

5. Figure 5 Streamlit output_1

Interactive application panel looks like this:

Affectation des profils aux activités

Navigation

- Page d'accueil
- Tester l'application
- Saisie manuelle

Configuration

Choisir le modèle :

Modèle 5

Type d'échelle

free

Choisir la fonction MCAP

Moyenne

Saisie manuelle des données

Nombre d'activités Nombre de profils

4
-
+
4
-
+

Nombre de compétences

4
-
+

Matrice MCA (Compétences des Activités)

	Comp1	Comp2	Comp3	Comp4
Act1	2	1	2	4
Act2	5	4	4	2
Act3	2	0	1	3
Act4	4	0	4	4

Exporter MCA

Matrice MCP (Compétences des Profils)

	Comp1	Comp2	Comp3	Comp4
Prof1	5	4	3	1
Prof2	1	3	3	2
Prof3	3	2	3	3
Prof4	4	1	2	0

Dimensions de la matrice MCA : (4, 4)

Dimensions de la matrice MCP : (4, 4)

Exporter MCP
 Lancer le traitement

Traitement en cours...

6. Figure 6 Streamlit output_2

Project Structure

```
profiles_assignment/
├── src/                      # Source code
│   ├── core/                  # Core processing logic
│   │   ├── __init__.py
│   │   └── mcap_processor.py
│   ├── models/                # Model implementations
│   │   ├── __init__.py
│   │   ├── mcap_functions.py
│   │   └── model_functions.py
│   ├── utils/                 # Utility functions
│   │   ├── __init__.py
│   │   └── logger.py
│   └── streamlit/             # Streamlit app components
│       └── app.py
└── web/                      # Web application
    ├── backend/               # FastAPI backend
    │   ├── app/
    │   │   ├── routes.py
    │   │   ├── models.py
    │   │   └── database.py
    │   ├── config/
    │   │   └── main.py
    │   └── frontend/            # React frontend
    │       ├── public/
    │       └── src/
    ├── config/                 # Configuration files
    │   └── mylogger.ini          # Logging configuration
    ├── data/                   # Data files
    │   ├── input/                # Input CSV files
    │   └── output/               # Generated outputs
    │       └── figures/           # Generated plots
    ├── tests/                  # Test suite
    ├── requirements.txt          # Python dependencies
    ├── main.py                 # CLI entry point
    └── README.md               # Project documentation
```