Dataset 1: Protein expression in Down's syndrome mice model
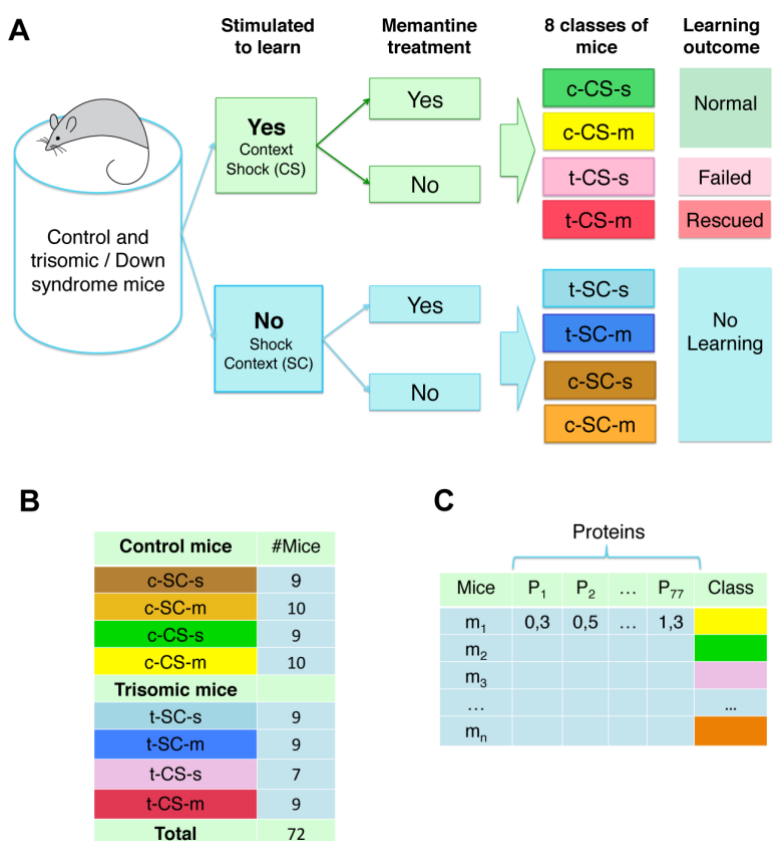
About Dataset

The data set consists of the expression levels of 77 proteins/protein modifications that produced detectable signals in the nuclear fraction of cortex. There are 38 control mice and 34 trisomic mice (Down syndrome), for a total of 72 mice. In the experiments, 15 measurements were registered of each protein per sample/mouse. The dataset contains a total of 1080 measurements per protein. Each measurement was considered as an independent sample/mouse.

The eight classes of mice are described based on features such as genotype, behavior and treatment. According to genotype, mice can be control or trisomic. According to behavior, some mice have been stimulated to learn (context-shock) and others have not (shock-context) and in order to assess the effect of the drug memantine in recovering the ability to learn in trisomic mice, some mice have been injected with the drug and others have not.

Analysis – Brainhack 2024 Magdeburg

The purpose of this project is to try to identify subsets of proteins that are discriminant for each class.

The project referring to original article by Clara Higuera, Katheleen J. Gardiner and Krzysztof J. Cios (*Article Link*.). It is definitely worth reading. The goal to replicate their idea.

Control mice	#Mice
c-SC-s	9
c-SC-m	10
c-CS-s	9
c-CS-m	10
Trisomic mice	
t-SC-s	9
t-SC-m	9
t-CS-s	7
t-CS-m	9
Total	72

Mice	P_1	P_2	...	P_{77}	Class
m_1	0,3	0,5	...	1,3	
m_2					
m_3					
...					...
m_n					

Two methods for conducting your analysis. Select the one that best suits your needs:

1. Running on Google Colab

Google Colab is a cloud-based Python development environment that provides a platform for anyone to write and execute Python code through the browser. It is especially useful for machine learning, data analysis and education.

Steps:

1. **Open Google Colab**: Open your browser and navigate to Google Colab.
2. **Create a New Notebook**: Click on File -> New notebook to create a new notebook.
3. **Write Python Code**: A new notebook will open, here you can write and execute your Python code. Each cell in the notebook can contain code or text. To add a new cell, you can click on + Code or + Text in the top left corner.
4. **Run a Cell**: To run a cell, click on the play button in the left side of the cell or press Shift + Enter. The output will be displayed below the cell.
5. **Save and Share the Notebook**: You can save your notebook by clicking on File -> Save. Google Colab notebooks are saved to your Google Drive. You can share your notebook by clicking on the Share button in the top right corner.

2. Running Locally on Your Machine Using Anaconda

Anaconda is a free and open-source distribution of the Python and R programming languages for scientific computing, that aims to simplify package management and deployment.

Steps:

1. **Download Anaconda**: Go to the Anaconda website and download the Anaconda version for your operating system.

    1. **Visit the Anaconda Website**: Go to the [Anaconda Downloads page](#) (scroll down to find the Anaconda installers, as demonstrated in the accompanying Figure).
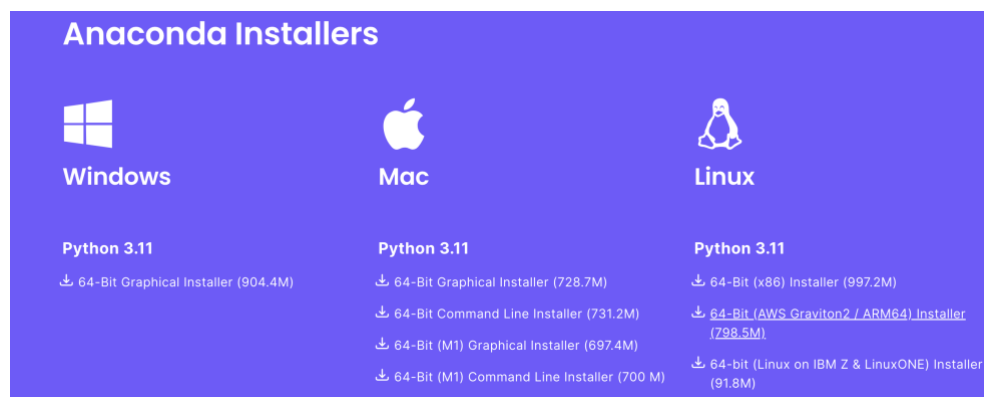
    2. **Select the Python 3.x Graphical Installer**: Choose the appropriate installer based on your operating system: -> Double click to download it.

- ○ **Windows**: Download the **Python 3.11 64-Bit Graphical Installer** (904.4 MB) [1].
- ○ **Mac**: If you're using an M1 Mac, download the **64-Bit (M1) Graphical Installer** (697.4 MB) [1]. Otherwise, choose the **Python 3.11 64-Bit Graphical Installer** (728.7 MB) [1].
- ○ **Linux**: Depending on your system architecture, select one of the following:
  - ▪ **64-Bit (x86) Installer** (997.2 MB) [1].
  - ▪ **64-Bit (AWS Graviton2 / ARM64) Installer** (798.5 MB) [1].
  - ▪ **64-bit (Linux on IBM Z & LinuxONE) Installer** (91.8 MB) [1].

Remember to opt for the M1 version if you're using an M1 Mac. Happy coding! 🐍✨

2. **Install Anaconda**: Open the downloaded file and follow the installation instructions.
3. **Open Anaconda Navigator**: After the installation is complete, open the Anaconda Navigator which is a desktop graphical user interface included in Anaconda that allows you to launch applications and easily manage conda packages.
4. **Launch Jupyter Notebook**: In the Anaconda Navigator, launch Jupyter Notebook. This will open a new browser window (or a new tab) with the Notebook Dashboard, a sort of control panel that allows you to navigate to your workspaces and manage your Jupyter Notebooks.
5. **Create a New Notebook**: In the Notebook Dashboard, navigate to the directory where you want to create your notebook, click on New, and select Python 3 or the version of Python you have installed.
6. **Write Python Code**: Similar to Google Colab, you can write your Python code in cells and run them.