Agentic AI (代理式AI)

1. 生成式AI vs 代理式AI
2. 生成式AI在研究（數據分析、資料視覺化）的應用
3. 上下文
4. Agentic AI 的程式
5. AGENTS.md

Generative AI（生成式AI）

根據使用者提供的指令（Prompt）與既有知識，**產生新的內容**的人工智慧。

Agentic AI（代理式AI）

能根據使用者設定的目標，**自主規劃任務、拆解步驟、使用工具、取得資訊、執行行動，並依結果持續調整策略**，直到完成目標的人工智慧系統。

生成式 AI vs 代理式AI

Generative AI =「你問，它產生內容」

Agentic AI =「你交代任務，它規劃並動手完成」

使用者：「幫我寫 Python 程式分析這份資料。」

→ AI 產生程式碼
→ 使用者自己執行
→ 發現錯誤
→ 再詢問 AI。

→ AI 讀取資料
→ 檢查資料品質
→ 選擇分析方法
→ 撰寫並執行程式
→ 發現錯誤後修正
→ 產生圖表
→ 整理結論與報告。

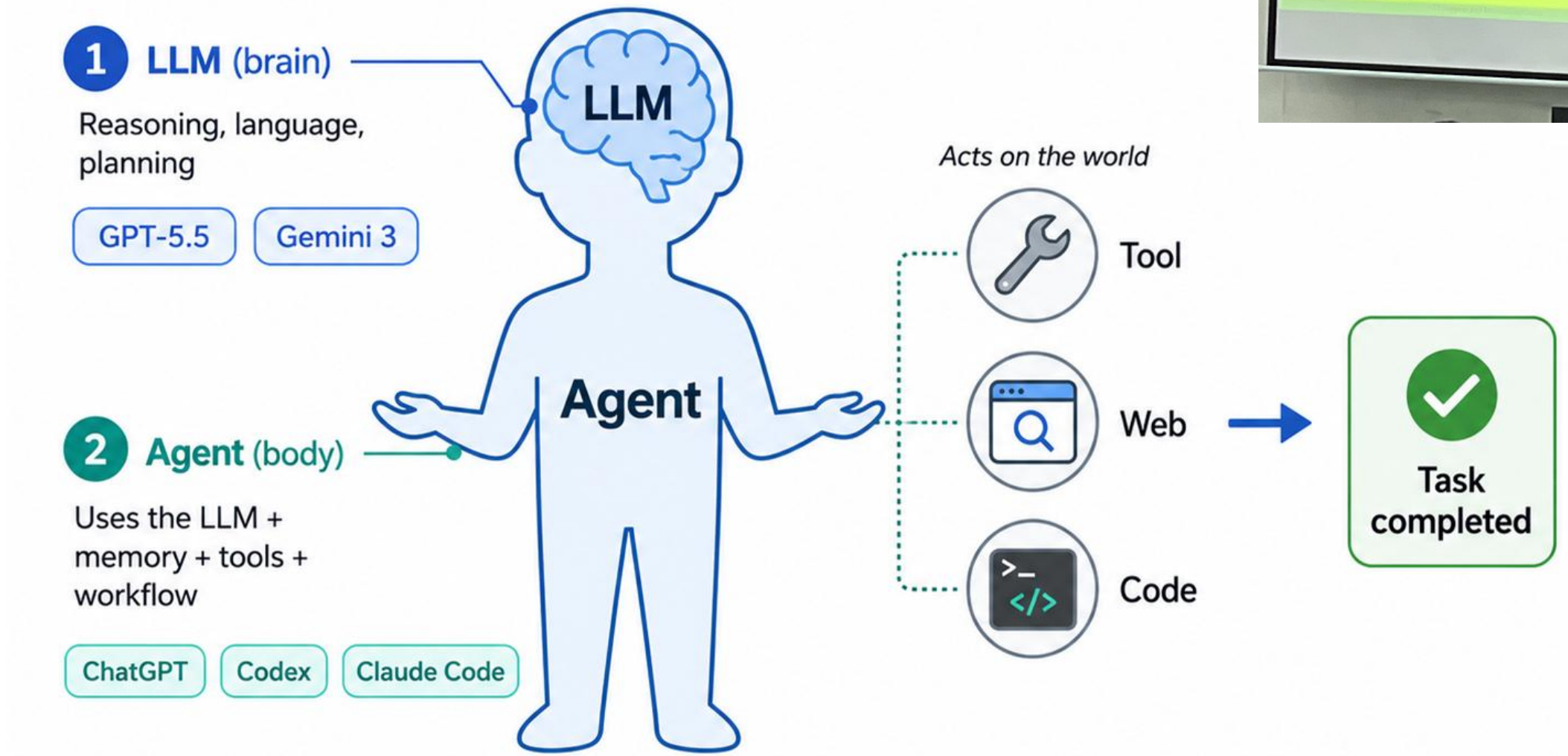
Agentic AI 可以想像成安裝在電腦裡的智慧小幫手。

它的大腦仍然在雲端，但已經不只是回答問題，而是可以**實際操作電腦**、**查看畫面**、**讀取與存取檔案**，並**協助完成任務**。

（也可不在雲端，但大部分都還是在雲端）

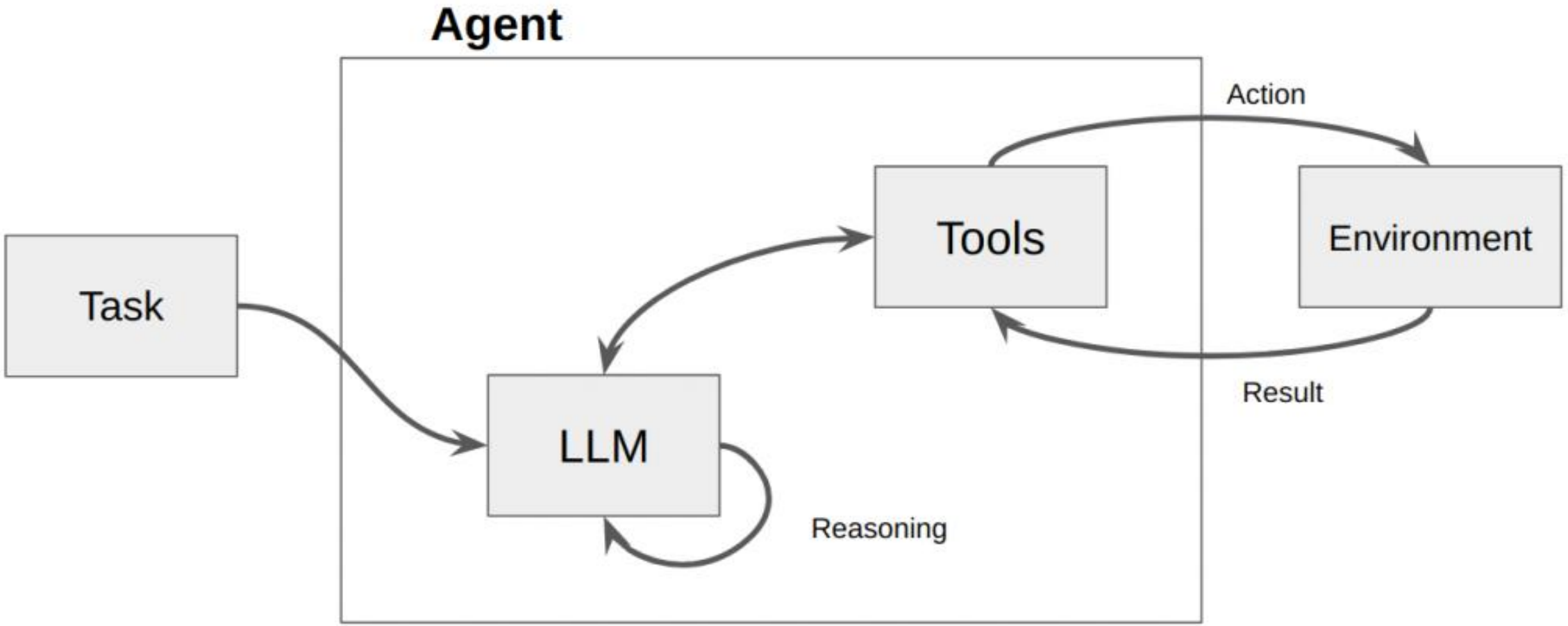
LLM IS THE BRAIN, AGENT IS THE FULL BODY THAT CAN ACT





Slide from 長庚大學 AI Innovation & Support Center 朱柏諺老師

WHAT IS AN AI AGENT? CHATGPT IS AN AGENT!



Reference: https://medium.com/@yash9439/using-langchain-react-agents-with-qdrant-and-llama3-for-intelligent-information-retrieval-b181ce7a5962

Slide from 長庚大學AI Innovation & Support Center 朱柏諺老師

情境應用

1. 先 讓 AI 學會操作 某個系統 或 APP
2. 由 AI 代勞操作
3. 人工檢核/AI檢查



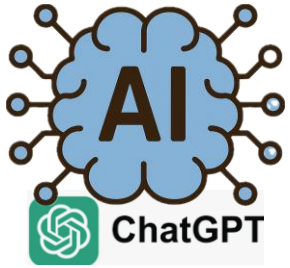
2026.06.23 | AI與大數據

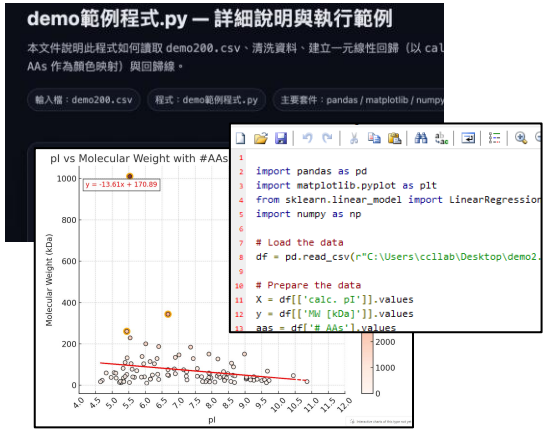
Codex推出Record and Replay！只要示範一次工作流程，就能讓AI記住你的SOP

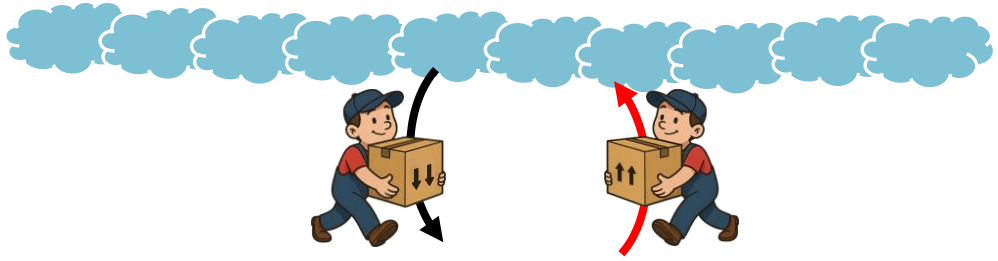
Codex上線全新工作模式，結合「先錄後重播」與「技能」，讓使用者只需示範一次電腦操作，Codex 即可學習並封裝成可重複調用的自動化流程。

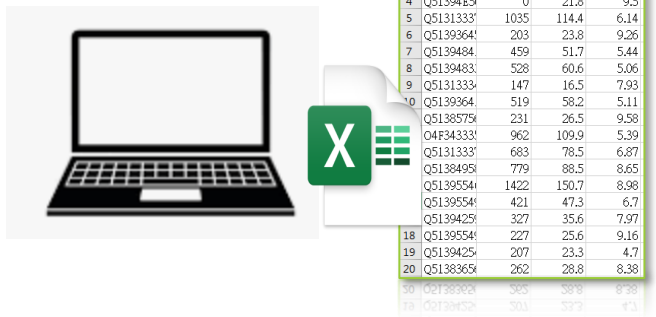
＃時事追蹤　＃Codex

雲端 AI

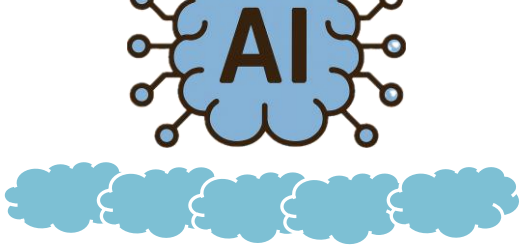








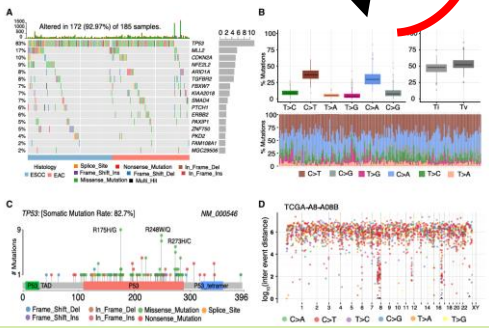
	A	B	C	D
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2	O4F39353(	402	44.3	8.16
3	Q5136513(	670	74.6	7.15
4	Q5139435(	0	21.8	9.5
5	Q5131333(	1035	114.4	6.14
6	Q5139364(	203	23.8	9.26
7	Q5139484(	459	51.7	5.44
8	Q5139483(	528	60.6	5.06
9	Q5131333(	147	16.5	7.93
10	Q5139364(	519	58.2	5.11
11	Q5138575(	231	26.5	9.58
12	O4F34333(	962	109.9	5.39
13	Q5131333(	683	78.5	6.87
14	Q5138495(	779	88.5	8.65
15	Q5139554(	1422	150.7	8.98
16	Q5139554(	421	47.3	6.7
17	Q5139425(	327	35.6	7.97
18	Q5139554(	227	25.6	9.16
19	Q5139425(	207	23.3	4.7
20	Q5138365(	262	28.8	8.38

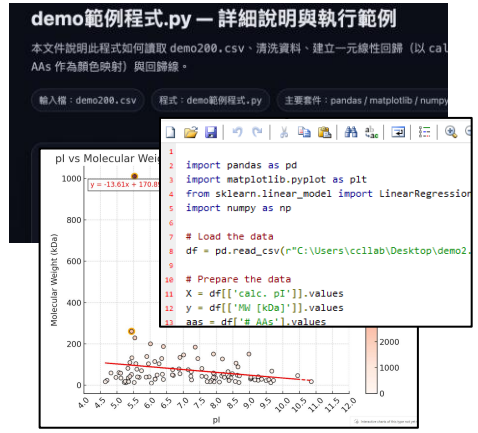


Agentic AI









實驗室建置的專業分析工具

1. 生成式AI vs 代理式AI
2. 生成式AI在研究（數據分析、資料視覺化）的應用
3. 上下文
4. Agentic AI 的程式
5. 上機操作

2-1. 人機協作
2-2. 再現性 與 維護性

demo.csv

給AI的提示詞 (Prompt)：

找出數據的異常、缺失的列數，去除這些異常資料列；以圖表方式摘要這一份數據

	A	B	C	D
1	Accession	# AAs	MW [kDa]	calc. pI
2	O4F39353:	402	44.3	8.16
3	Q5136513(	670	74.6	7.15
4	Q51394E5(	0	21.8	9.5
5	Q5131333'	1035	114.4	6.14
6	Q5139364!	203	23.8	9.26
7	Q5139484.	459	51.7	5.44
8	Q5139483:	528	60.6	5.06
9	Q5131333-	147	16.5	7.93
10	Q5139364.	519	58.2	5.11
11	Q5138575(	231	26.5	9.58
12	O4F34333!	962	109.9	5.39
13	Q5131333'	683	78.5	6.87
14	Q5138495(	779	88.5	8.65
15	Q5139554(	1422	150.7	8.98
16	Q5139554!	421	47.3	6.7
17	Q5139425!	327	35.6	7.97
18	Q5139554!	227	25.6	9.16
19	Q5139425-	207	23.3	4.7
20	Q5138365(	262	28.8	8.38
50	O2T383Q2(	3Q3	38'8	8'38

https://claude.ai/

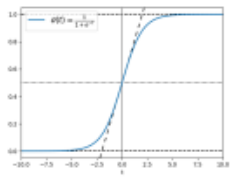


指定工具套件與名稱 ➔ 照菜單點餐

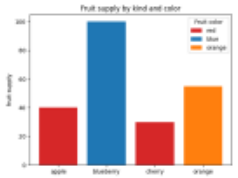
matplotlib

Section Navigation

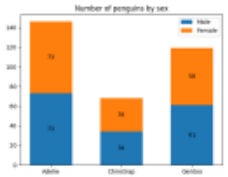
- Lines, bars and markers
- Images, contours and fields
- Subplots, axes and figures
- Statistics
- Pie and polar charts
- Text, labels and annotations
- Color
- Shapes and collections
- Style sheets
- Module - pyplot
- Module - axes_grid1
- Module - axisartist
- Showcase
- Animation
- Event handling
- Miscellaneous
- 3D plotting
- Scales
- Specialty plots
- Spines



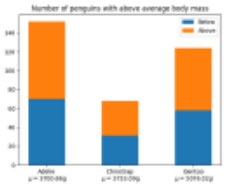
Infinite lines



Bar chart with individual bar colors



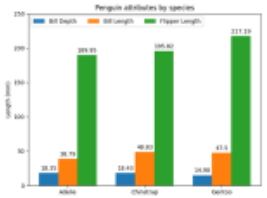
Bar chart with labels



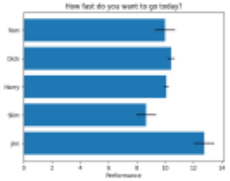
Stacked bar chart

Matplotlib

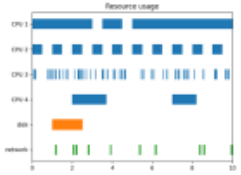
https://matplotlib.org/stable/gallery/index.html



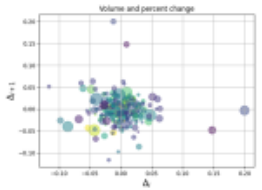
Grouped bar chart with labels



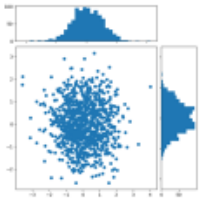
Horizontal bar chart



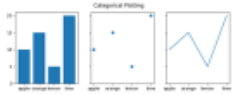
Broken horizontal bars



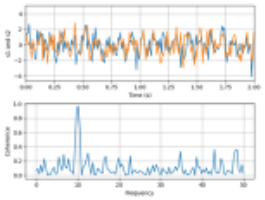
Scatter Demo2



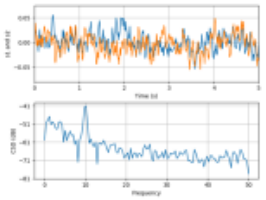
Scatter plot with histograms



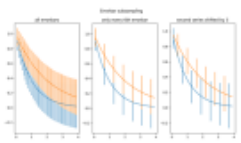
Plotting categorical variables



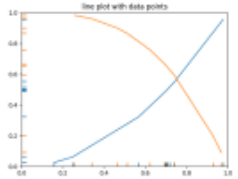
Plotting the coherence of two signals



Cross spectral density (CSD)



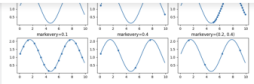
Errorbar subsampling



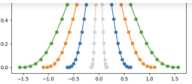
EventCollection Demo

Section Navigation

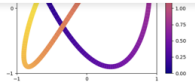
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- 3D plotting
- Scales
- Specialty plots
- Spines
- Ticks
- Units
- Embedding Matplotlib in graphical user interfaces
- Widgets



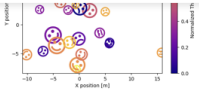
Markevery Demo



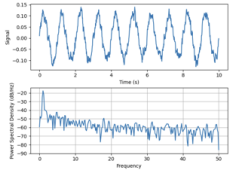
Plotting masked and NaN values



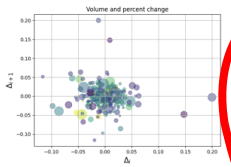
Multicolored lines



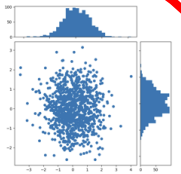
Mapping marker properties to multivariate data



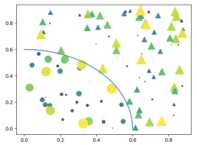
Power spectral density (PSD)



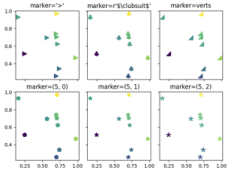
Scatter Demo2



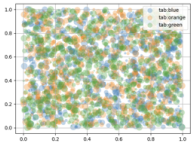
Scatter plot with histograms



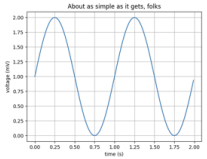
Scatter plot with masked values



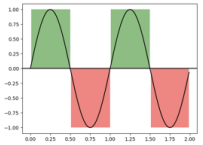
Marker examples



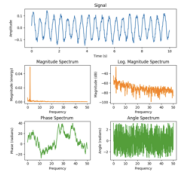
Scatter plot with a legend



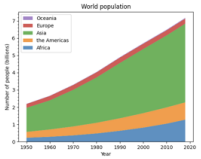
Line plot



Shade regions defined by a logical mask using fill_between



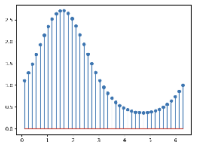
Spectrum representations



Stackplots and streamgraphs



Stairs Demo



Stem plot

Scatter plot with histograms

Add histograms to the x-axes and y-axes margins of a scatter plot.

This layout features a central scatter plot illustrating the relationship between x and y, a histogram at the top displaying the distribution of x, and a histogram on the right showing the distribution of y.

For a nice alignment of the main Axes with the marginals, two options are shown below:

Defining the Axes positions using subplot_mosaic

Defining the Axes positions using inset_axes

While `Axes.inset_axes` may be a bit more complex, it allows correct handling of main Axes with a fixed aspect ratio.

Let us first define a function that takes x and y data as input, as well as three Axes, the main Axes for the scatter, and two marginal Axes. It will then create the scatter and histograms inside the provided Axes.

```
import matplotlib.pyplot as plt
import numpy as np

# Fixing random state for reproducibility
np.random.seed(19680801)

# some random data
x = np.random.randn(1000)
y = np.random.randn(1000)


def scatter_hist(x, y, ax, ax_histx, ax_histy):
    # no labels
    ax_histx.tick_params(axis="x", labelbottom=False)
    ax_histy.tick_params(axis="y", labelleft=False)

    # the scatter plot:
    ax.scatter(x, y)

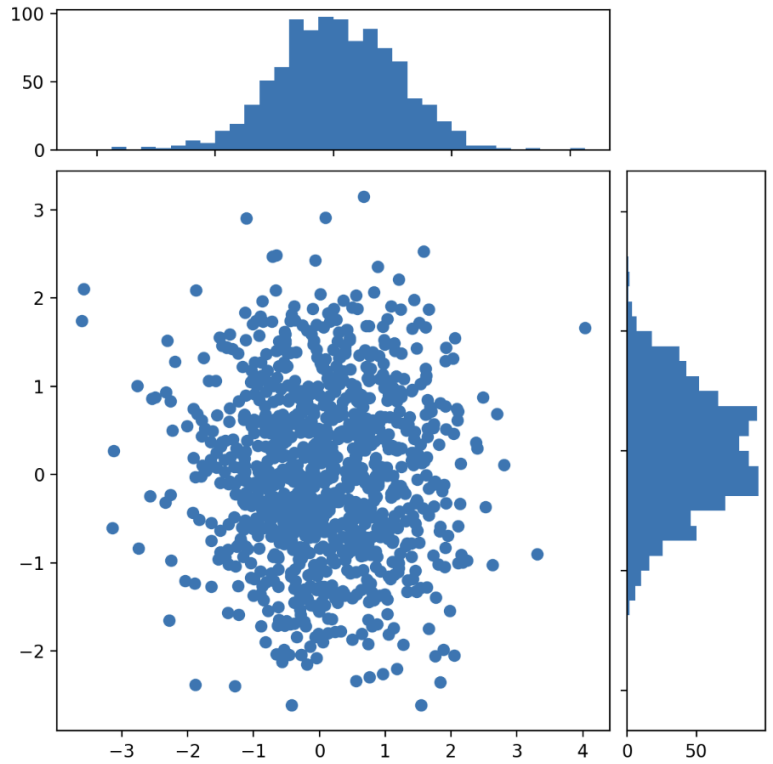
    # now determine nice limits by hand:
    binwidth = 0.25
    xymax = max(np.max(np.abs(x)), np.max(np.abs(y)))
    lim = (int(xymax/binwidth) + 1) * binwidth

    bins = np.arange(-lim, lim + binwidth, binwidth)
    ax_histx.hist(x, bins=bins)
    ax_histy.hist(y, bins=bins, orientation='horizontal')
```

Defining the Axes positions using subplot_mosaic

We use the `subplot_mosaic` function to define the positions and names of the three axes; the empty axes is specified by `'.'`. We manually specify the size of the figure, and can make the different axes have different sizes by specifying the *width_ratios* and *height_ratios* arguments. The *layout* argument is set to `'constrained'` to optimize the spacing between the axes.

```
fig, axs = plt.subplot_mosaic([['histx', '.'],
                               ['scatter', 'histy']],
                              figsize=(6, 6),
                              width_ratios=(4, 1), height_ratios=(1, 4),
                              layout='constrained')
scatter_hist(x, y, axs['scatter'], axs['histx'], axs['histy'])
```



告訴我 matplotlib 的 Scatter plot with histograms 有哪些設定項目，給我一些範例的圖

一、什麼是 Scatter plot with histograms？

這種圖會同時顯示：

- **中央：Scatter plot** → 看 X 與 Y 的關係
- **上方：X 的 histogram** → 看 X 的分布
- **右側：Y 的 histogram** → 看 Y 的分布

👉 一張圖就能同時回答：

「資料怎麼分布？」＋「兩個變數怎麼相關？」

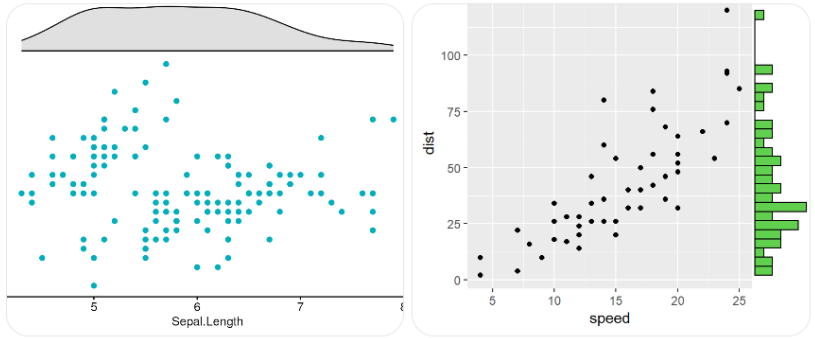
二、常見的設定項目（重點整理）

🔷 Scatter plot（中央散點圖）

常用參數（`plt.scatter()`）：

- `x, y`：資料
- `s`：點的大小
- `alpha`：透明度（避免點重疊）
- `c` / `color`：顏色
- `marker`：點的形狀（`'o'`, `'x'`, `'^'`...）
- `edgecolor`：點的邊框顏色
- `linewidths`：邊框粗細

▶ 範例 2：高密度資料（搭配透明度）



📌 視覺技巧：

- `alpha < 0.5`
- histogram 顯示資料集中區域

▶ 範例 3：不同群組 / 顏色區分

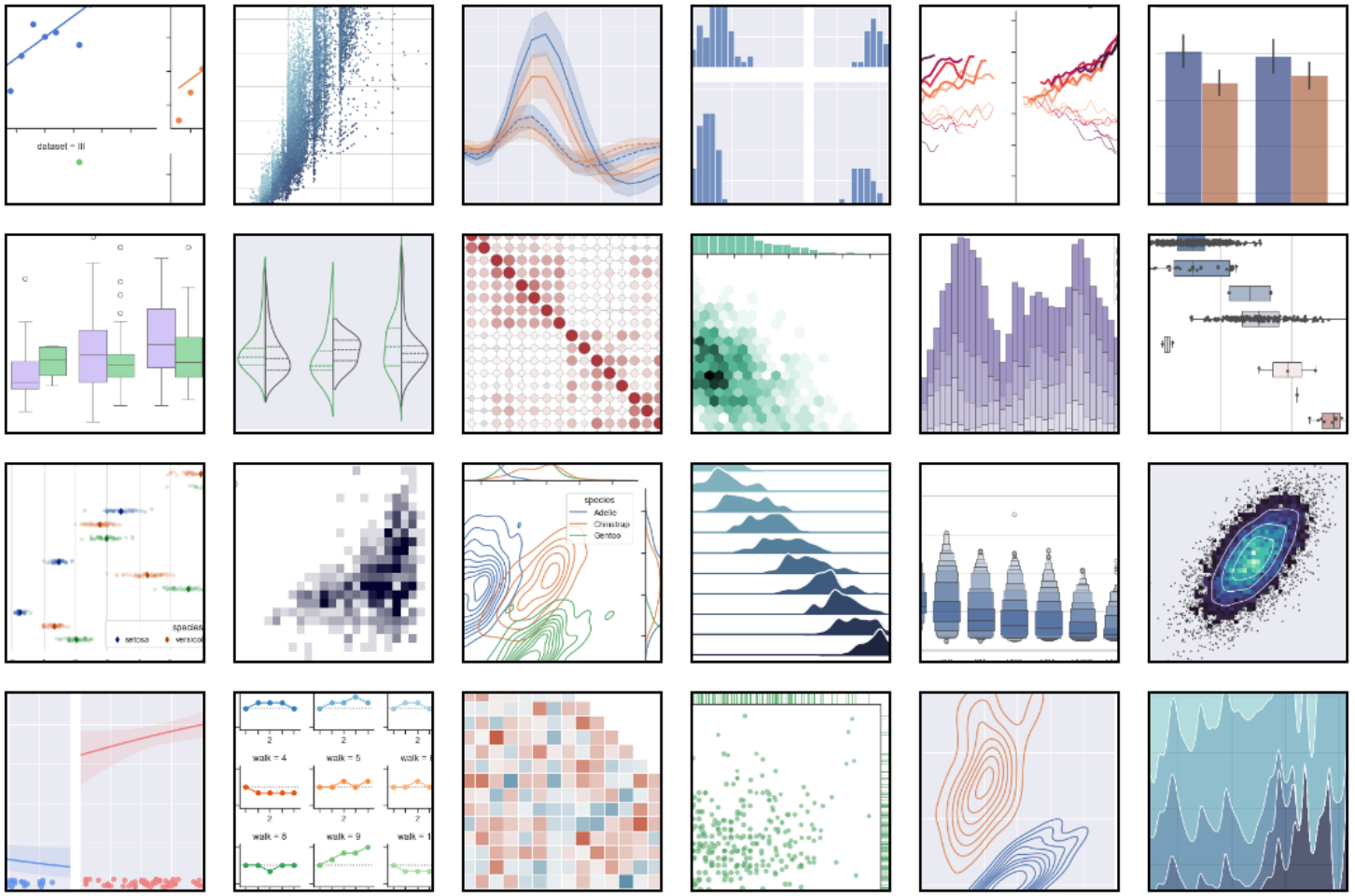


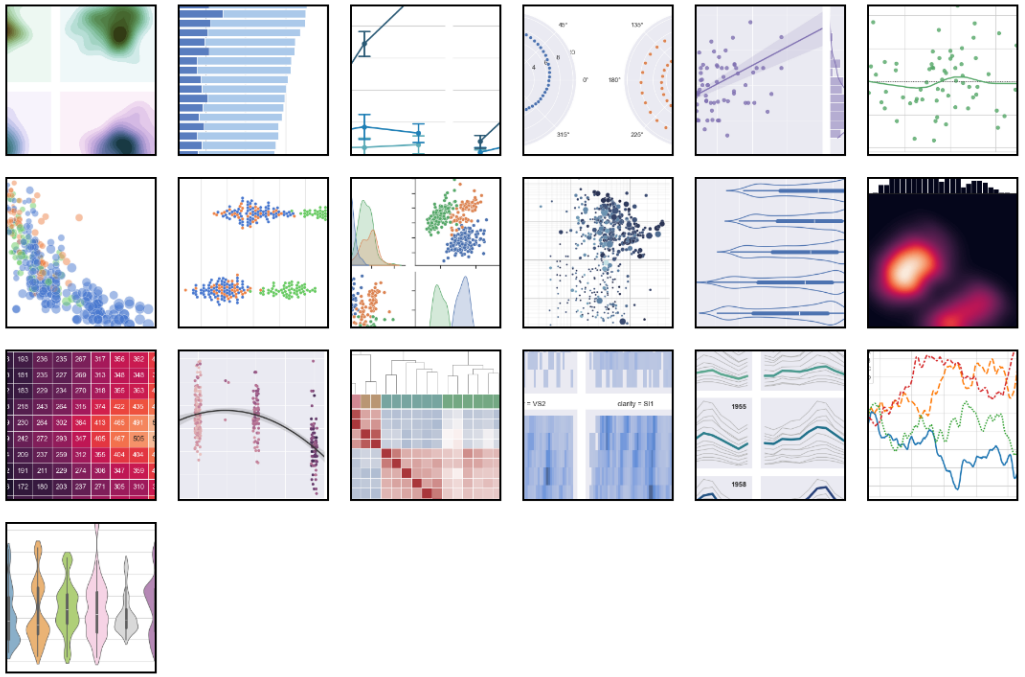
📌 用途：

- 比較不同類別的分布差異
- 常用於分類前分析

Seaborn

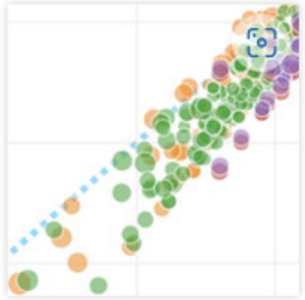
https://seaborn.pydata.org/examples/index.html



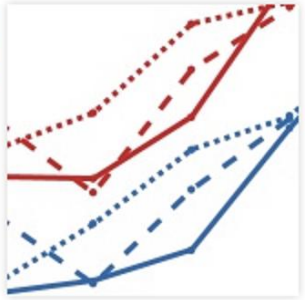


Plotly

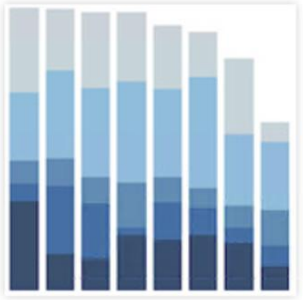
https://plotly.com/python/



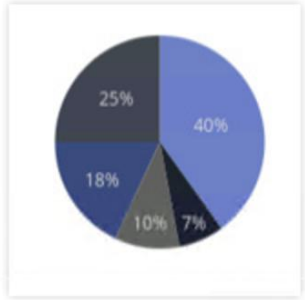
Scatter Plots



Line Charts



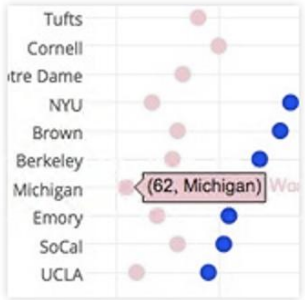
Bar Charts



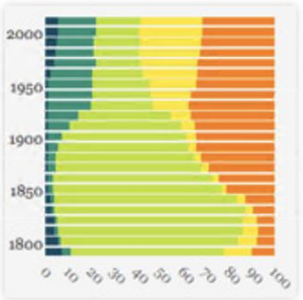
Pie Charts



Bubble Charts



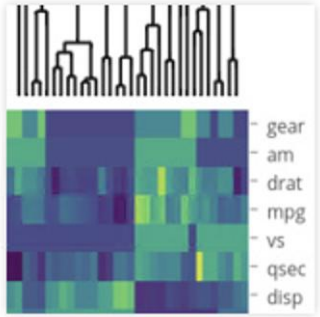




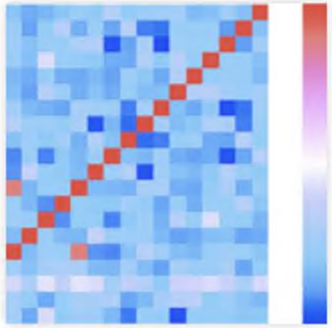




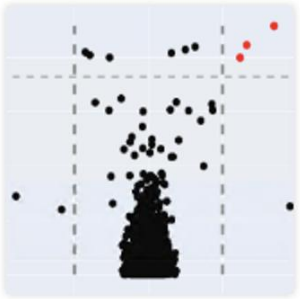
Sunburst Charts



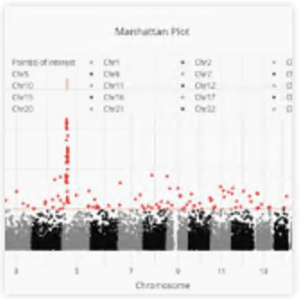
Dendrograms



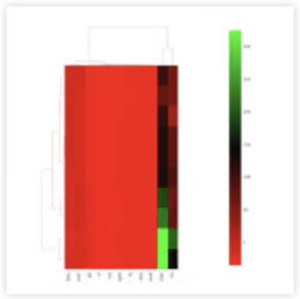
Heatmaps



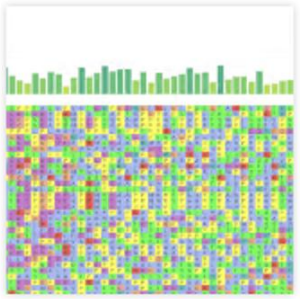
Volcano Plot



Manhattan Plot



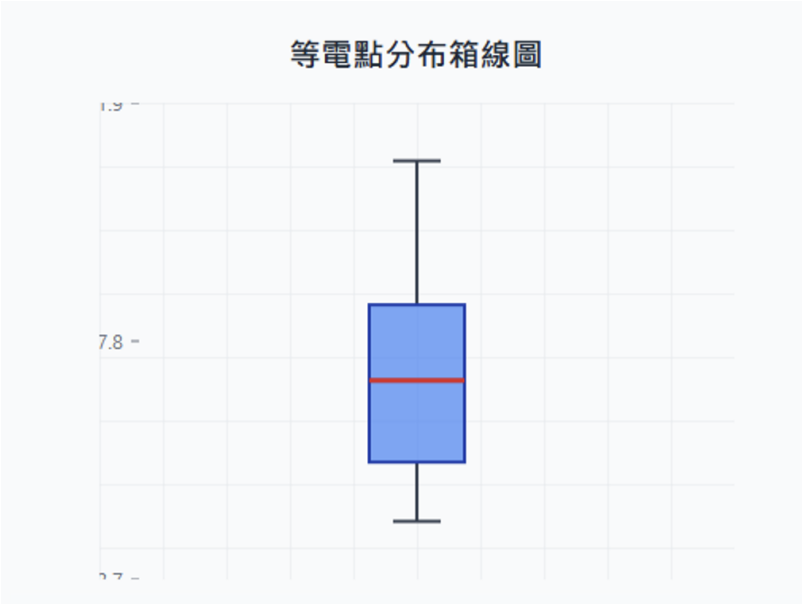
Clustergram



Alignment Chart

給AI的提示詞 (Prompt)：

使用ploty，以pI值繪製Boxplot

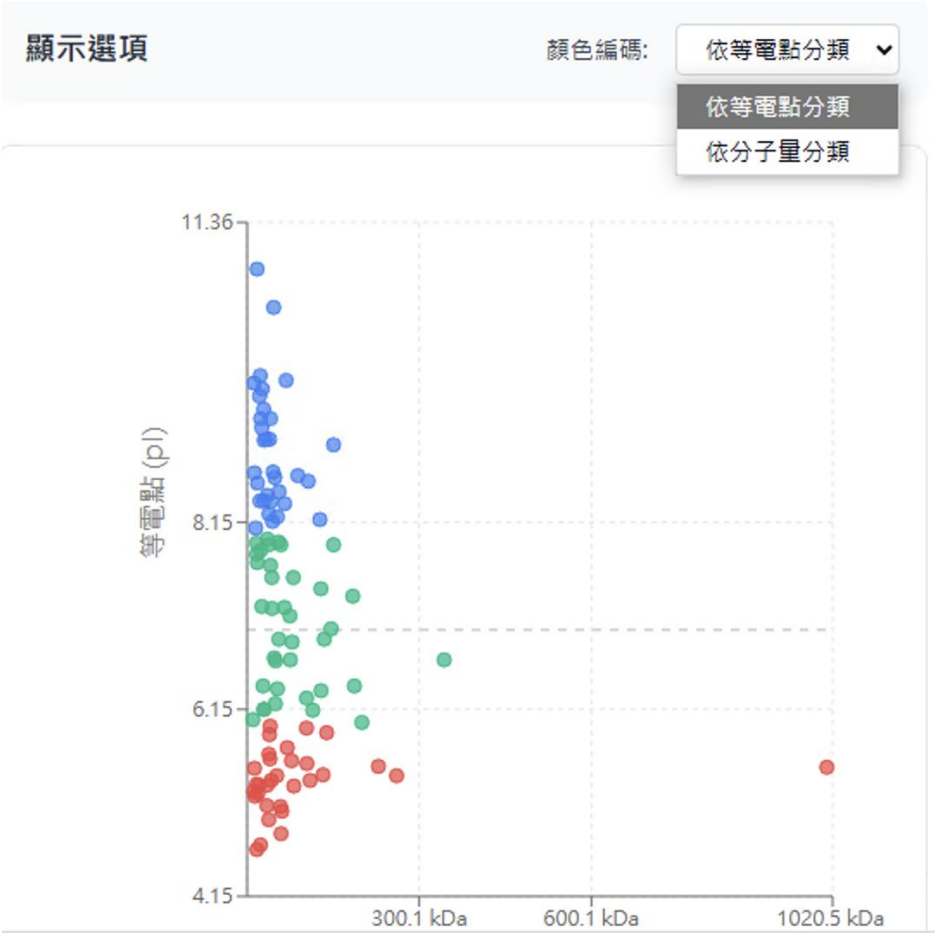




demo.csv

給AI的提示詞 (Prompt)：

使用ploty，以分子量為x軸，pI值為y軸，繪製Scatter plot



上手試玩

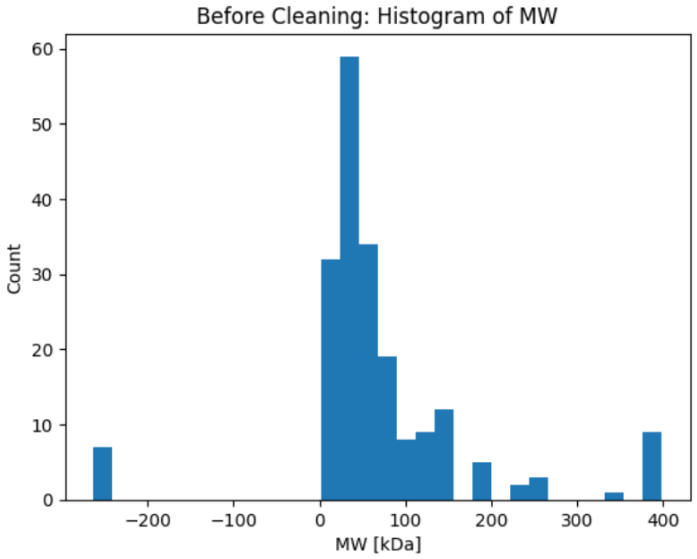
ChatGPT 5.2

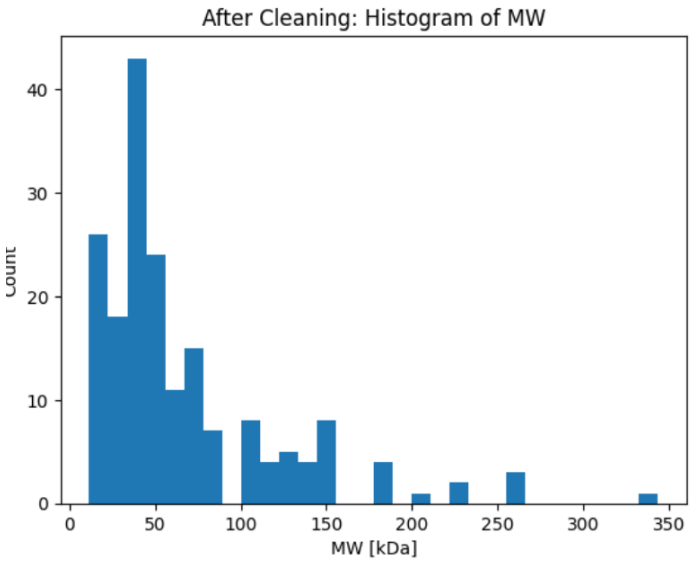
demo.csv

給AI的提示詞 (Prompt)：

找出異常數值，去除異常數值之後，製作一份摘要報告

	A	B	C	D
1	Accession	# AAs	MW [kDa]	calc. pI
2	O4F39353	402	44.3	8.16
3	Q5136513	670	74.6	7.15
4	Q51394E5	0	21.8	9.5
5	Q5131333	1035	114.4	6.14
6	Q5139364	203	23.8	9.26
7	Q5139484	459	51.7	5.44
8	Q5139483	528	60.6	5.06
9	Q5131333	147	16.5	7.93
10	Q5139364	519	58.2	5.11
11	Q5138575	231	26.5	9.58
12	O4F34333	962	109.9	5.39
13	Q5131333	683	78.5	6.87
14	Q5138495	779	88.5	8.65
15	Q5139554	1422	150.7	8.98
16	Q5139554	421	47.3	6.7
17	Q5139425	327	35.6	7.97
18	Q5139554	227	25.6	9.16
19	Q5139425	207	23.3	4.7
20	Q5138365	262	28.8	8.38





🔷 Before Cleaning

特徵：

- 分布出現 **長尾（long tail）**
- 包含：
  - 負值區間
  - 極右側少量高 MW
- 結果：
  - Bin 被撐開
  - 主體分布變得扁平、不易判讀

🔷 After Cleaning

特徵：

- 分布集中、單峰
- 符合生物直覺
- 右尾仍存在，但屬於合理變異

Google Gemini

給AI的提示詞 (Prompt)：

找出異常數值，去除異常數值之後，製作一份摘要報告

1. 異常數值分析與處理

在初步檢查數據時，發現數值欄位中存在顯著的**異常值（Outliers）與邏輯錯誤值**：

- **負值錯誤**：在 `# AAs` (氨基酸長度) 與 `MW [kDa]` (分子量) 欄位中出現了負數（例如：-2400.47）。在生物物理特性中，長度與質量不可能為負值。
- **重複數據**：部分 Accession（如 `O4F3135323133`）存在完全重複的紀錄。
- **極端離群值**：部分數值（如長度超過 3000）遠離該樣本集的常態分佈。

處理動作：

1. 刪除所有包含**負值**的列。
2. 移除重複的 Accession 紀錄（保留唯一值）。
3. 過濾後剩餘有效樣本數：約 **188** 筆（原約 200 筆）。

2. 數據摘要報告（清理後）

以下是去除了異常與重複值後的數據統計摘要：

統計指標	# AAs (長度)	MW [kDa] (分子量)	calc. pI (等電點)
平均值 (Mean)	451.23	50.84	6.82
中位數 (Median)	385.00	43.15	6.37
標準差 (Std)	284.15	31.98	1.48
最小值 (Min)	54.00	6.20	4.35
最大值 (Max)	1489.00	168.40	10.52

匯出到試算表

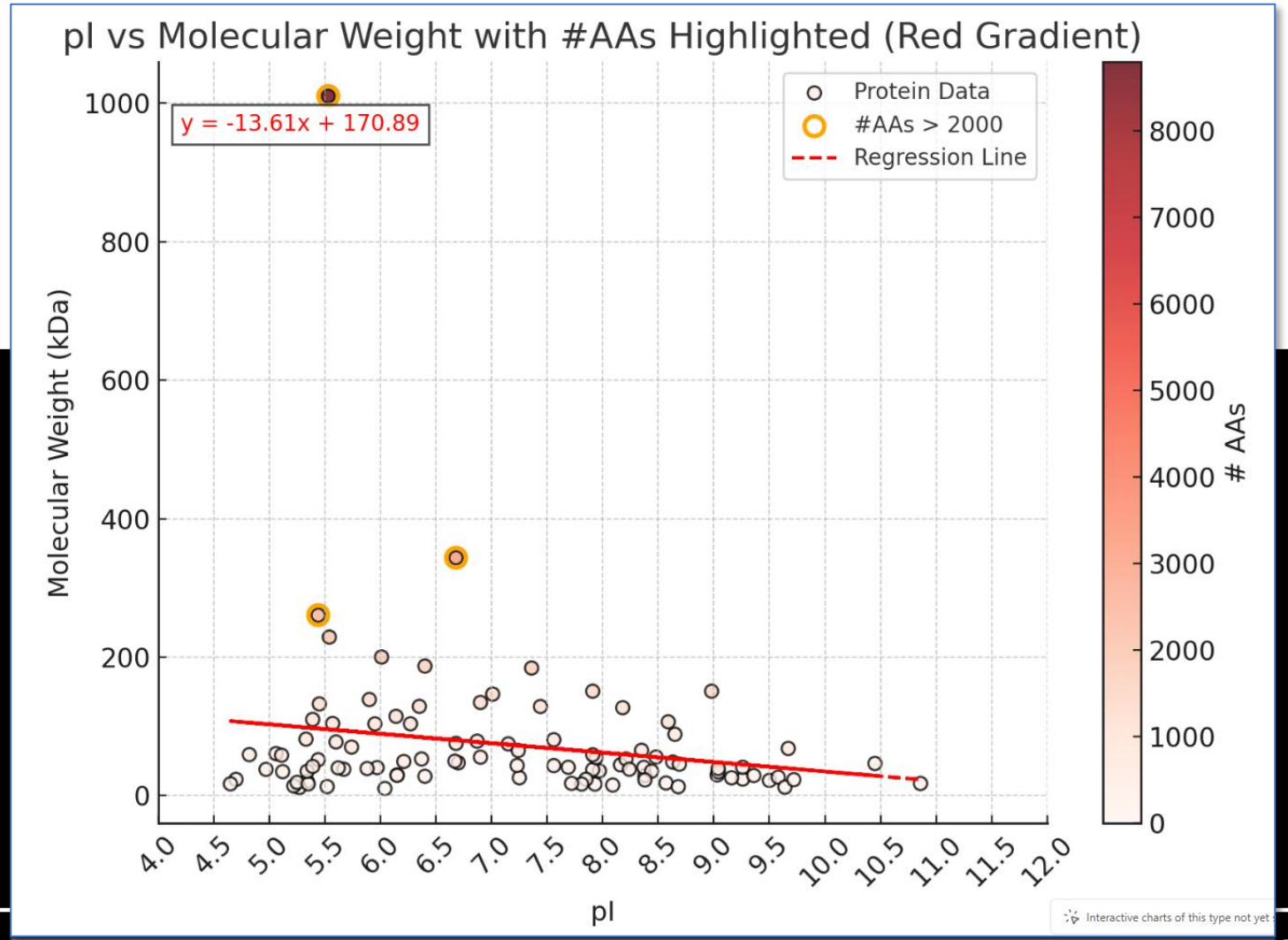
ChatGPT 5.2

demo.csv

散佈圖（Scatter Plot）

- **X 軸：pI，Y 軸：分子量**
- 加上顏色代表 `# AAs` 數量的多寡（例如用顏色深淺呈現）
- 用於觀察 pI 與分子量之間的分佈情形

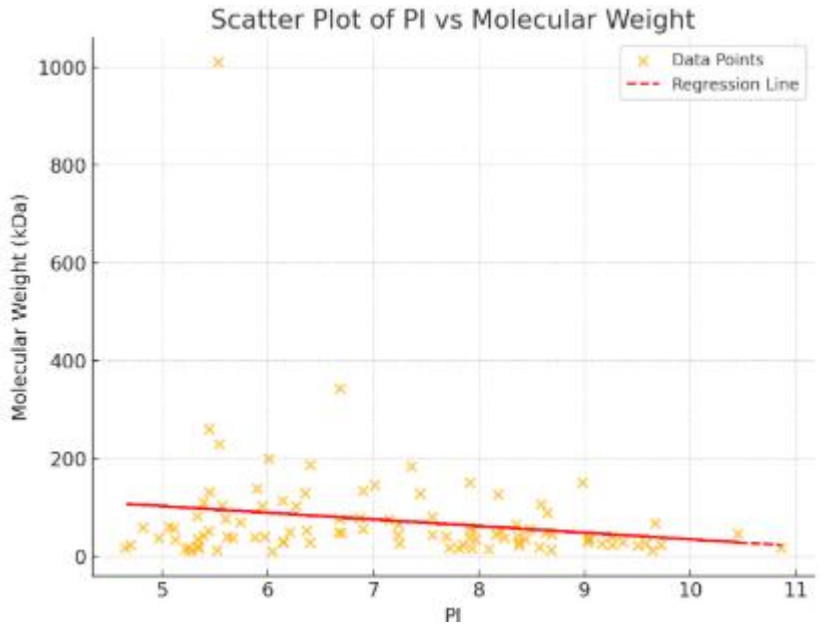
	A	B	C	D
1	Accession	# AAs	MW [kDa]	calc. pI
2	O4F39353	402	44.3	8.16
3	Q5136513	670	74.6	7.15
4	Q51394E5	0	21.8	9.5
5	Q5131333	1035	114.4	6.14
6	Q5139364	203	23.8	9.26
7	Q5139484	459	51.7	5.44
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17	Q5139425	327	35.6	7.97
18	Q5139554	227	25.6	9.16
19	Q5139425	207	23.3	4.7
20	Q5138365	262	28.8	8.38

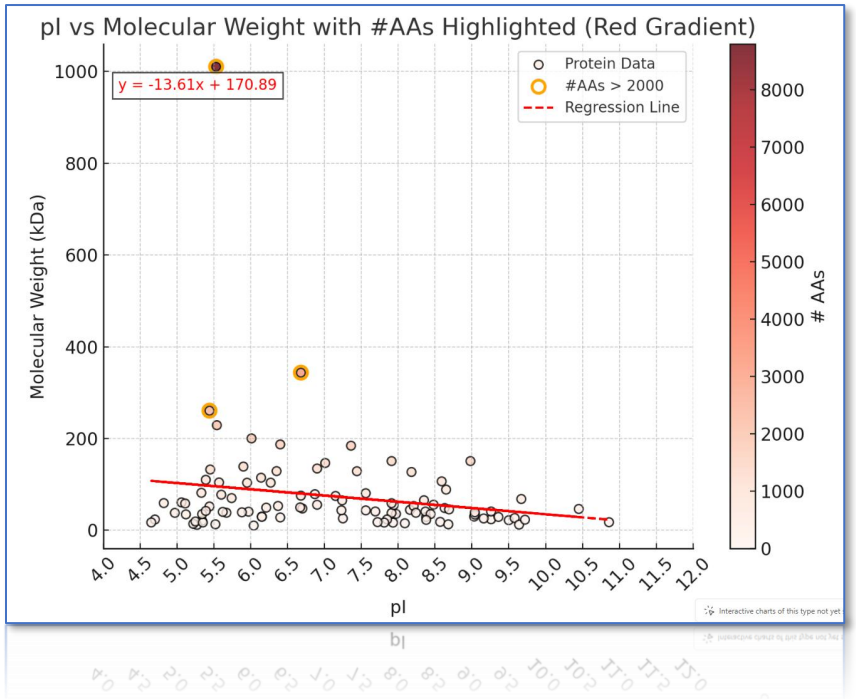


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人機協作繪圖

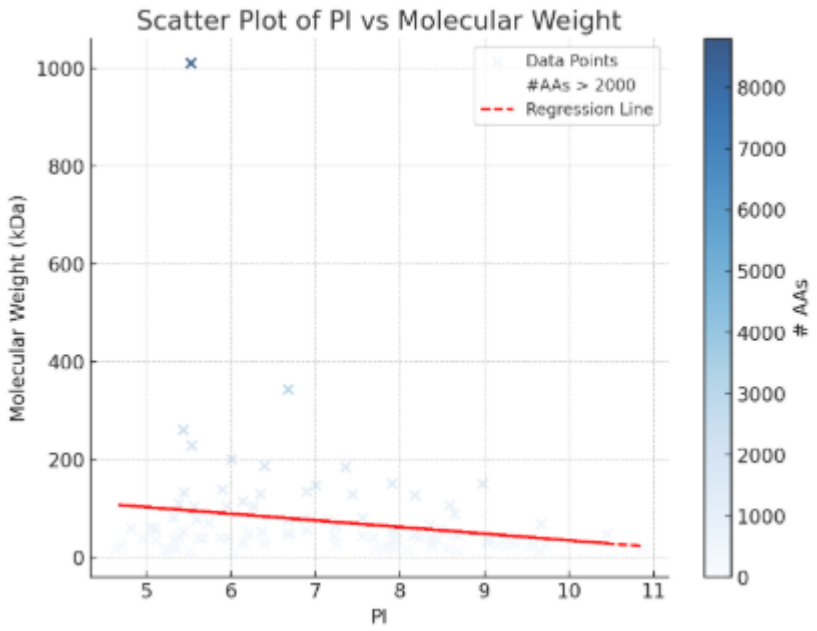
用 python matplotlib package 繪製 PI 跟分子量的 Scatter plot，Y軸是分子量、X軸是PI，並繪製一條紅色的Regression line

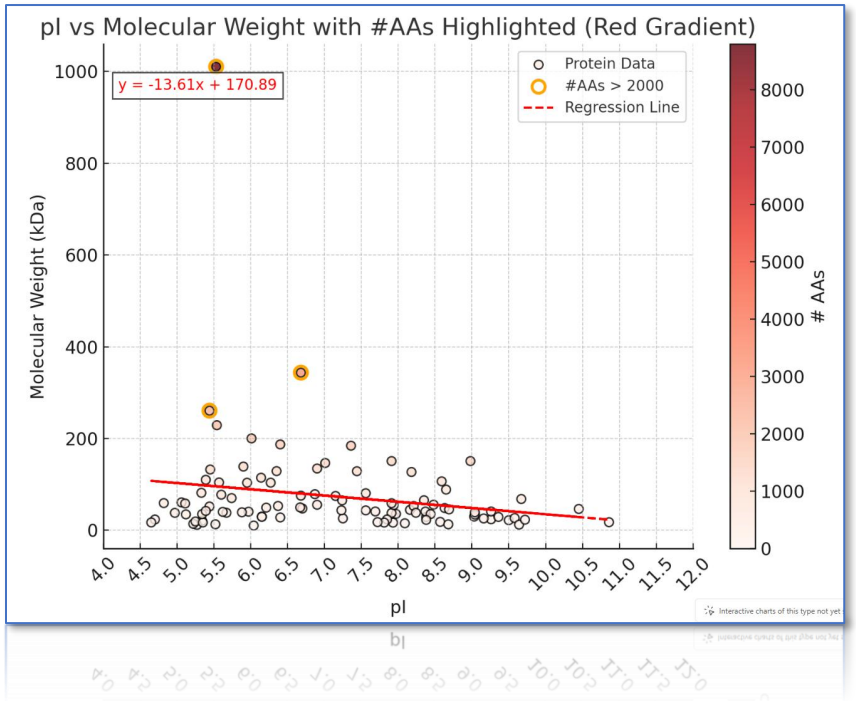




人機協作繪圖 (原則：AI是您的助理，慢慢跟AI一起改)

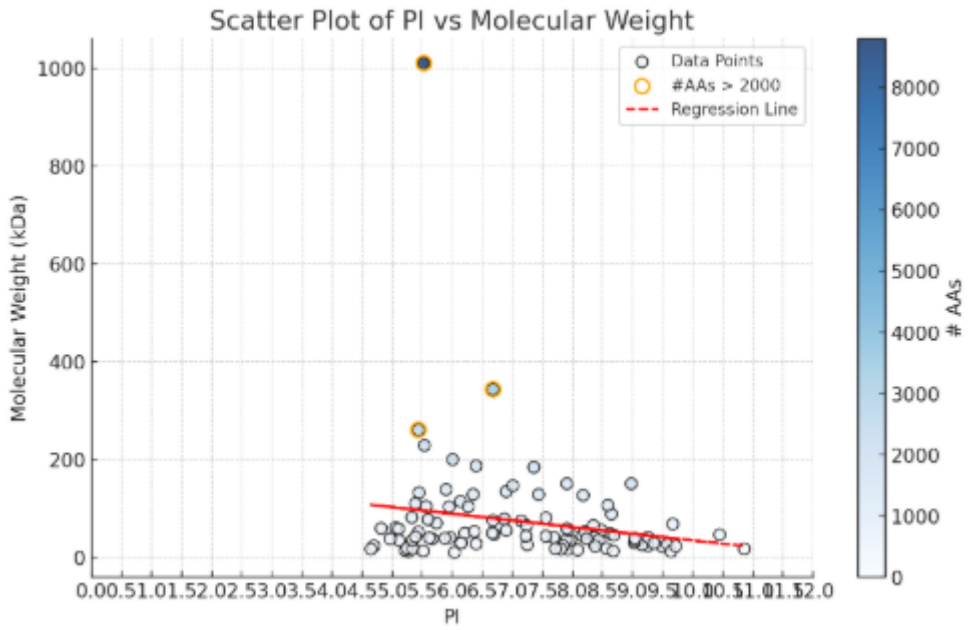
修改上圖，用顏色深淺表示每一個點的#AAs

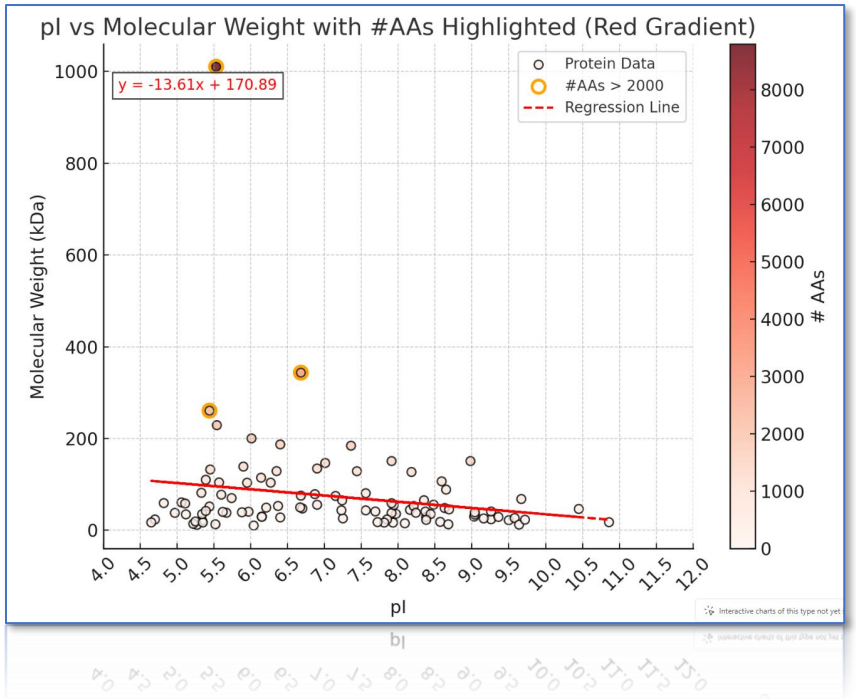




人機協作繪圖 (原則：AI是您的助理，慢慢跟AI一起改)

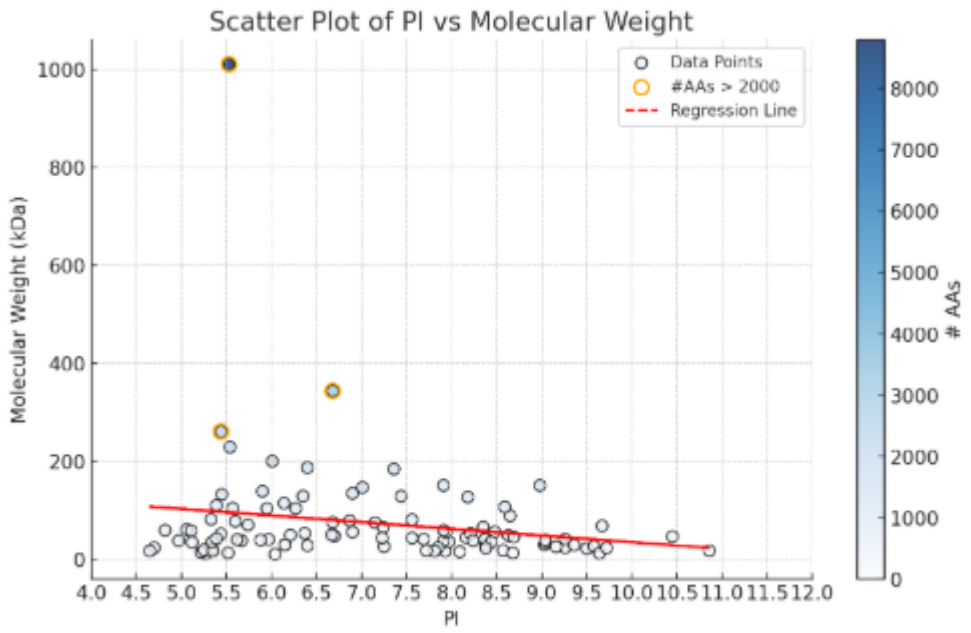
把圖形上的資料標註點，改成圓形， PI每0.5作一個級距

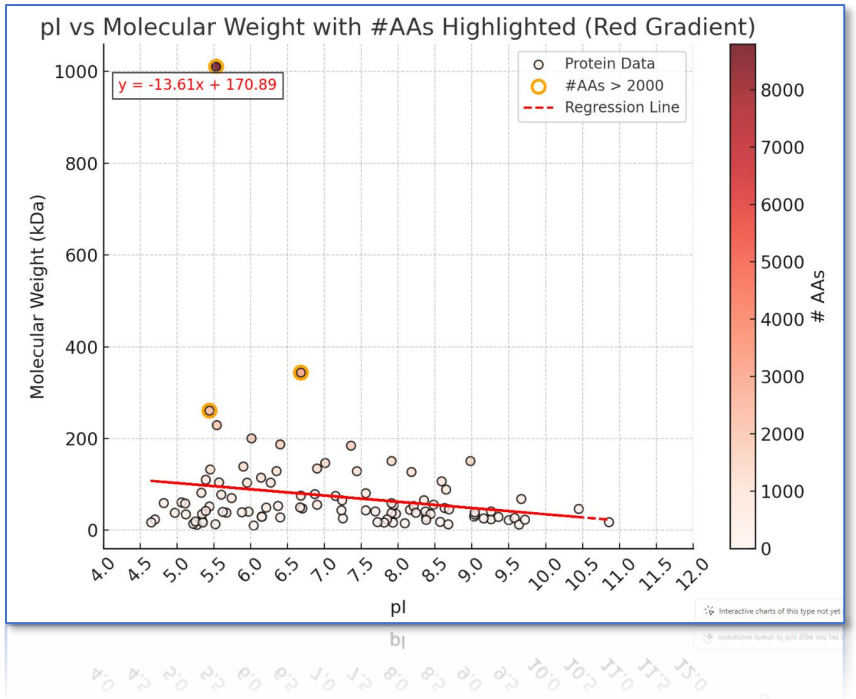




人機協作繪圖 (原則：AI是您的助理，慢慢跟AI一起改)

X軸 PI 的範圍設定為 4到12





人機協作繪圖 (原則：AI是您的助理，慢慢跟AI一起改)

在圖形加上 Regression line 的公式

