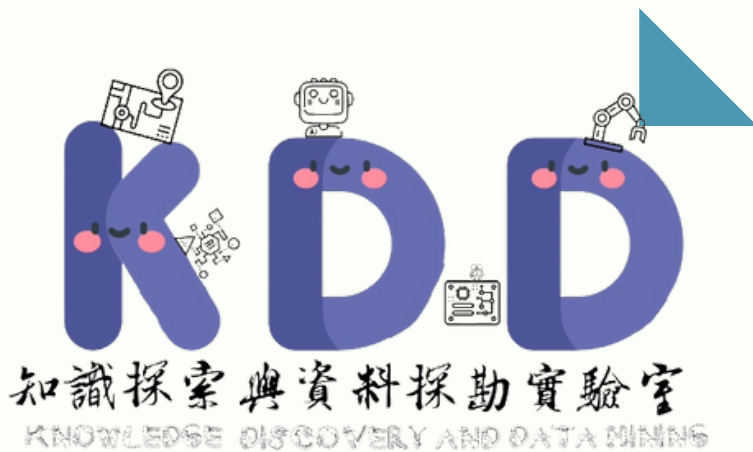




國立中興大學  
NATIONAL  
CHUNG HSING UNIVERSITY

# Experimental Log

Smart Motorcycle Online Diagnosis  
and Detection and Evaluation  
System for Driving Behavior



Department of Electrical Engineering, National Chung Hsing University  
Student: Yen, Wei-Liang (William)  
Supervisor: Prof. Hsiao-Ping Tsai

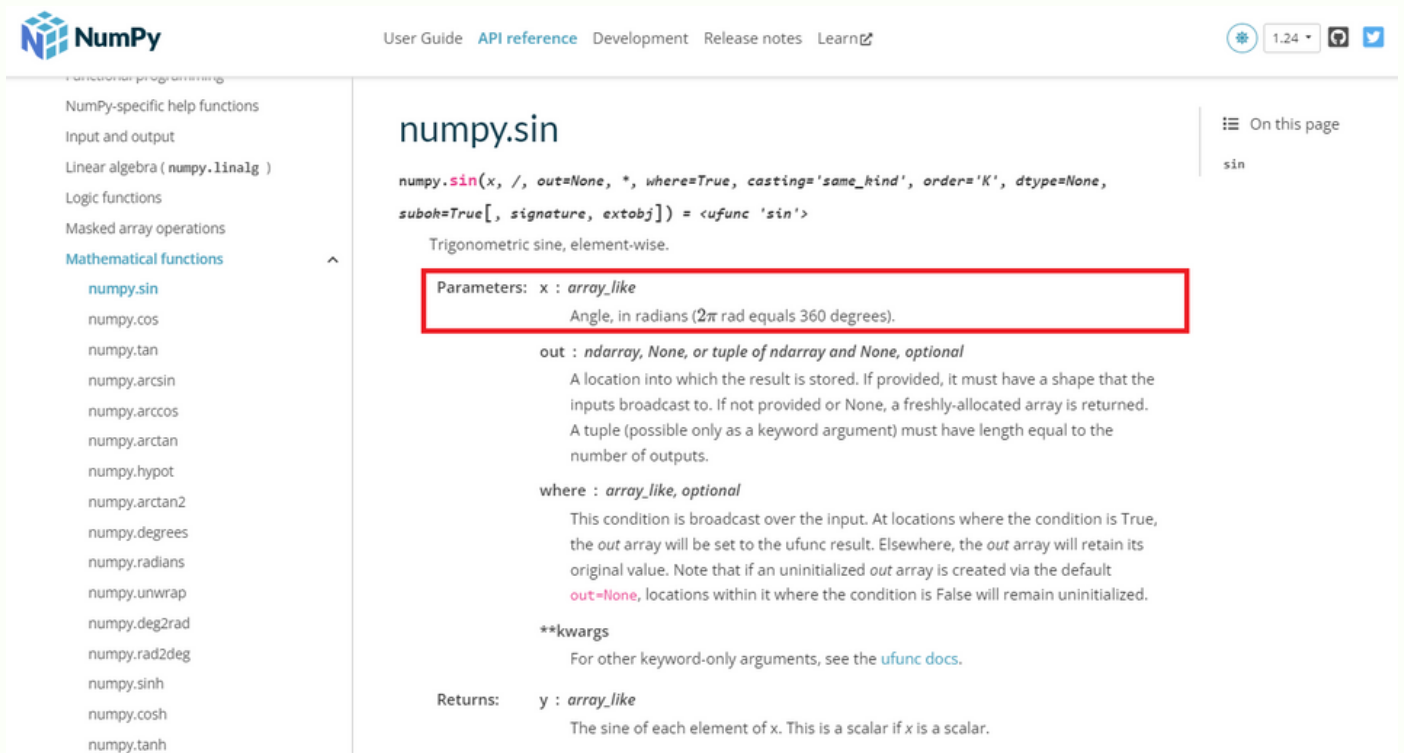
# Last week's review comments

- The flow chart needs to be modified and made according to the manufacturing specification
- Confirm the library input format used when making the rotation matrix
- Find research papers on sequence data analysis as a comparison for my experiment.
- Perform additional experiments to demonstrate the accuracy of using the rotation matrix correction function
- To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

# Fixes and Improvements

Q: Confirm the library input format used when making the rotation matrix:

A: Input: Angles are in radians



The screenshot shows the NumPy API reference page for `numpy.sin`. The page layout includes a sidebar on the left with a navigation menu, a main content area, and a right sidebar with a table of contents. The main content area displays the function signature, a description, and detailed parameter information. A red box highlights the 'Parameters' section, which specifies that the input `x` is of type `array_like` and represents an angle in radians.

**NumPy** User Guide [API reference](#) Development Release notes Learn

functional programming

NumPy-specific help functions

Input and output

Linear algebra ( `numpy.linalg` )

Logic functions

Masked array operations

**Mathematical functions**

- [numpy.sin](#)
- [numpy.cos](#)
- [numpy.tan](#)
- [numpy.arcsin](#)
- [numpy.arccos](#)
- [numpy.arctan](#)
- [numpy.hypot](#)
- [numpy.arctan2](#)
- [numpy.degrees](#)
- [numpy.radians](#)
- [numpy.unwrap](#)
- [numpy.deg2rad](#)
- [numpy.rad2deg](#)
- [numpy.sinh](#)
- [numpy.cosh](#)
- [numpy.tanh](#)

## numpy.sin

```
numpy.sin(x, /, out=None, *, where=True, casting='same_kind', order='K', dtype=None, subok=True[, signature, extobj]) = <ufunc 'sin'>
```

Trigonometric sine, element-wise.

**Parameters:** `x` : *array\_like*  
Angle, in radians ( $2\pi$  rad equals 360 degrees).

**out** : *ndarray, None, or tuple of ndarray and None, optional*  
A location into which the result is stored. If provided, it must have a shape that the inputs broadcast to. If not provided or `None`, a freshly-allocated array is returned. A tuple (possible only as a keyword argument) must have length equal to the number of outputs.

**where** : *array\_like, optional*  
This condition is broadcast over the input. At locations where the condition is `True`, the `out` array will be set to the ufunc result. Elsewhere, the `out` array will retain its original value. Note that if an uninitialized `out` array is created via the default `out=None`, locations within it where the condition is `False` will remain uninitialized.

**\*\*kwargs**  
For other keyword-only arguments, see the [ufunc docs](#).

**Returns:** `y` : *array\_like*  
The sine of each element of `x`. This is a scalar if `x` is a scalar.

On this page

- sin

# Fixes and Improvements

Q: Find research papers on sequence data analysis as a comparison for my experiment.

A: IEEE Transactions on Intelligent Transportation Systems

## Average JIF Percentile

[Export](#)

The Average Journal Impact Factor Percentile takes the sum of the JIF Percentile rank for each category under consideration, then calculates the average of those values. [Learn more](#)

ALL CATEGORIES AVERAGE

**93.17**

EDITION

Science Citation Index Expanded

ENGINEERING, CIVIL

**97.46**

ENGINEERING, ELECTRICAL &  
ELECTRONIC

**93.30**

TRANSPORTATION SCIENCE &  
TECHNOLOGY

**88.75**

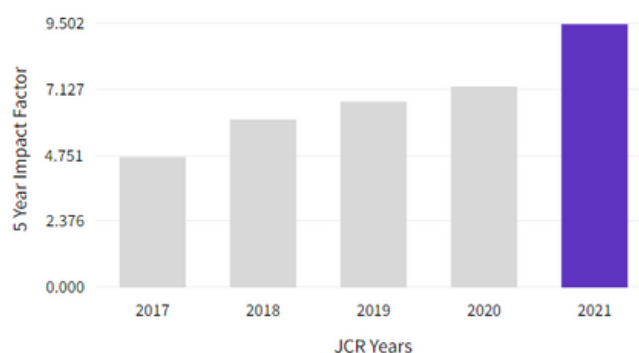
## 5 Year Impact Factor



**9.502**

[View Calculation](#)

The 5-year Impact Factor is the average number of times articles from the journal published in the past five years have been cited in the JCR year. It is calculated by dividing the number of citations in the JCR year by the total number of articles published in the five previous years.



# Fixes and Improvements

Q: Find research papers on sequence data analysis as a comparison for my experiment.

A: IEEE Transactions on Intelligent Transportation Systems

【2023/01】 A Sequence and Network Embedding Method for Bus Arrival Time Prediction Using GPS Trajectory Data Only

【2021/09】 Hybrid Group Anomaly Detection for Sequence Data: Application to Trajectory Data Analytics

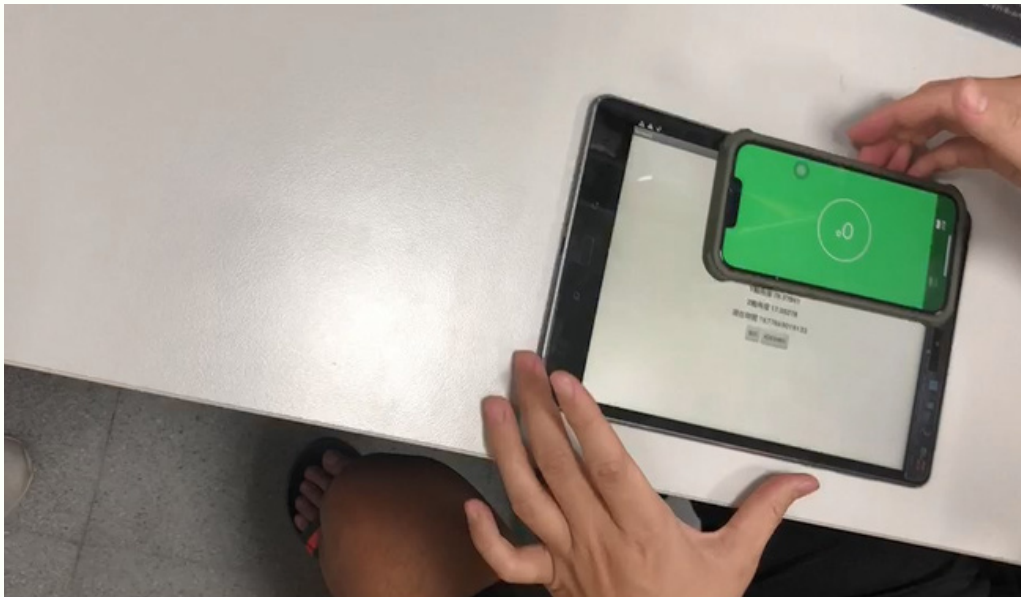
【2022/04】 SeqPolar: Sequence Matching of Polarized LiDAR Map With HMM for Intelligent Vehicle Localization

【2022/05】 Fully Convolutional Encoder-Decoder With an Attention Mechanism for Practical Pedestrian Trajectory Prediction

# Fixes and Improvements

Q: Perform additional experiments to demonstrate the accuracy of using the rotation matrix correction function

A: 可能沒算位移，45度校正，左右兩邊15度。會從x軸變z軸(非此圖)



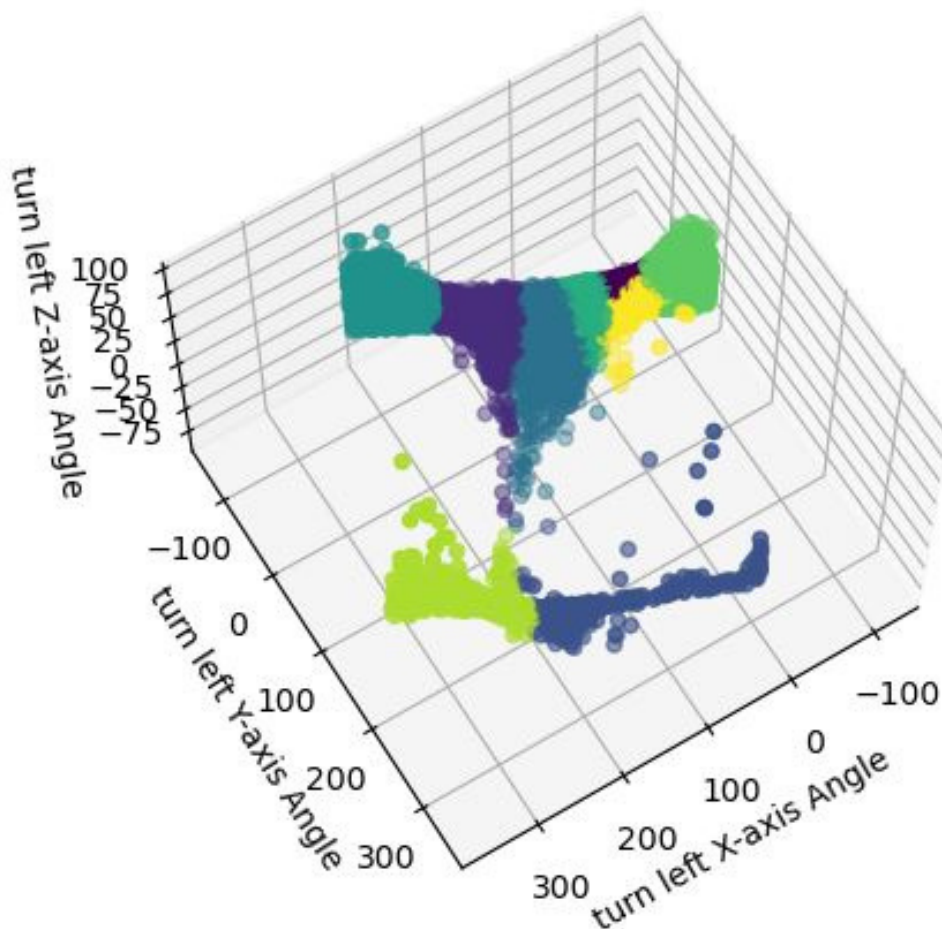
# Fixes and Improvements

Q: To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

A:

(方法一)

利用PCA將9軸維度降維成3維，K-mean分成9群



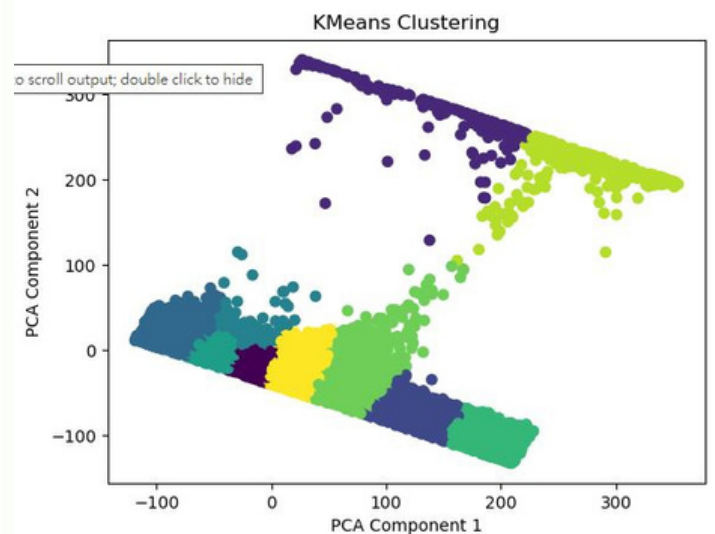
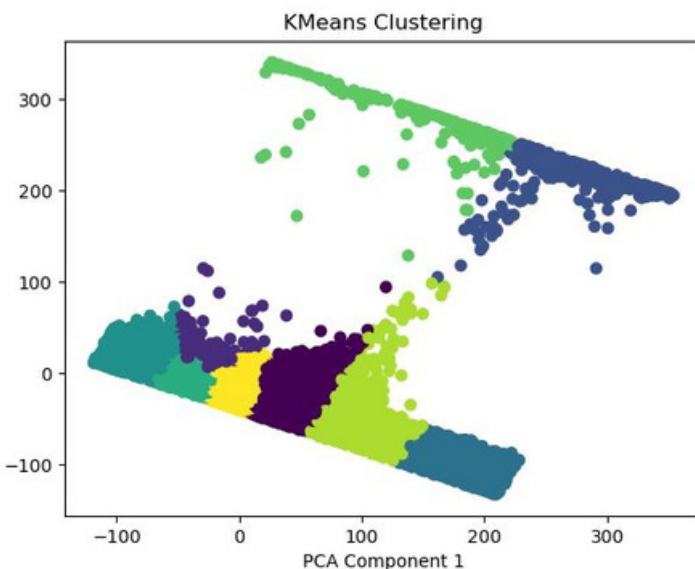
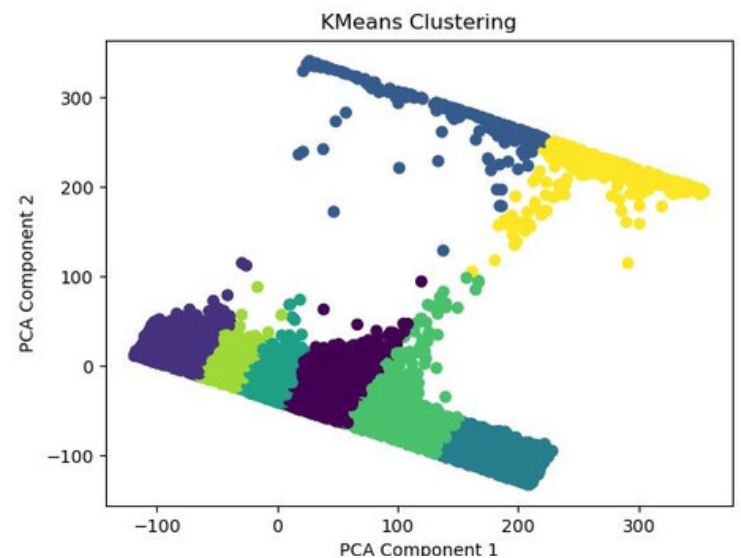
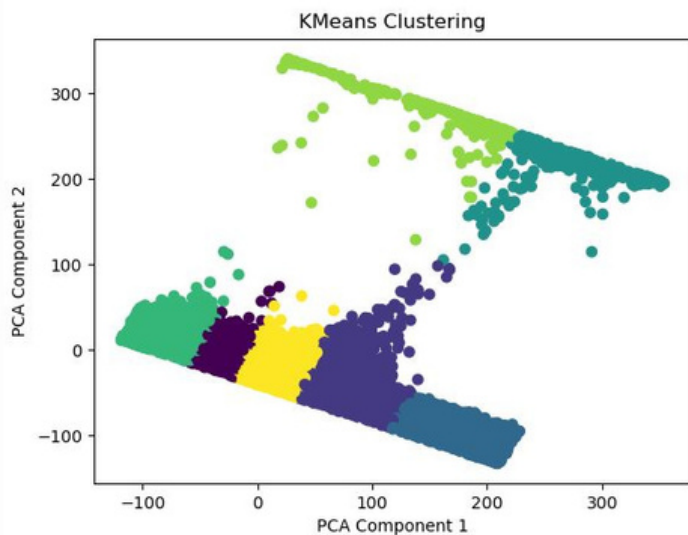
# Fixes and Improvements

Q: To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

A:

(方法一)

利用PCA將9軸維度降維成2維，K-mean分成7~10群





# Fixes and Improvements

Q: To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

A:

(方法二)

加速：

確定Y軸與車頭方向的加減速有關係

想到兩種方法來檢測瞬時的加速度變化上

第一種方法（初始值比較法）：

固定平板後在靜止狀態下測量出初始值，檢測到的Y軸加速度大於初始值時，則表示此時車輛處於加速狀態，反之亦然。

可能運到問題，如果在測試過程中，車輛處於長時間的等速運動狀態，則初始值比較法將無法判斷出車輛的運動狀態。

第二種方法（上一個狀態比較法）：

則不需要考慮初始值，可以避免車輛處於等速運動狀態下，但是，由於需要一直與前一個狀態的加速度值進行比較，因此其也存在一些不確定性。例如當車輛的運動狀態改變時，例如由減速轉為加速這種突然變化時，可能會出現顯著的加速度變化，或者是一些起起伏伏的微量變化。

# Fixes and Improvements

Q: To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

A:

(方法二)

轉彎：

確定Z軸車體偏左偏右有關

第一種方法（初始值比較法）：

固定平板後在靜止狀態下測量出初始值，檢測到的Z軸角度大於初始值時，則表示此時車輛處於偏右狀態，反之亦然。

第二種方法（上一個狀態比較法）：

則不需要考慮初始值，偏左偏右可能是比較出來的，

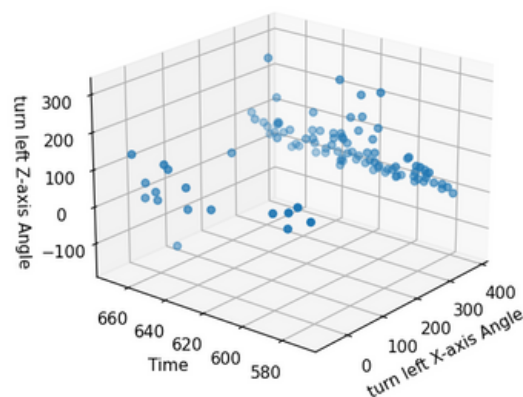
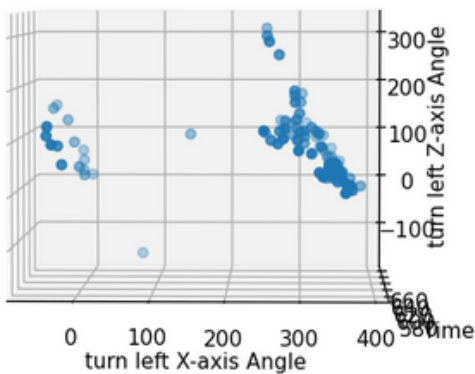
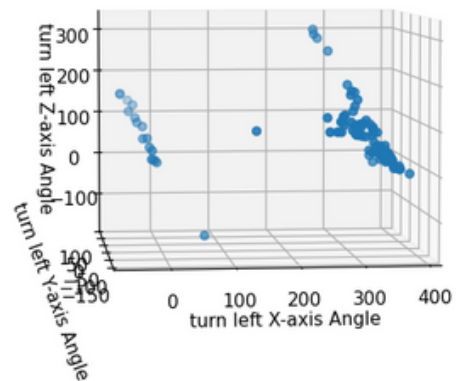
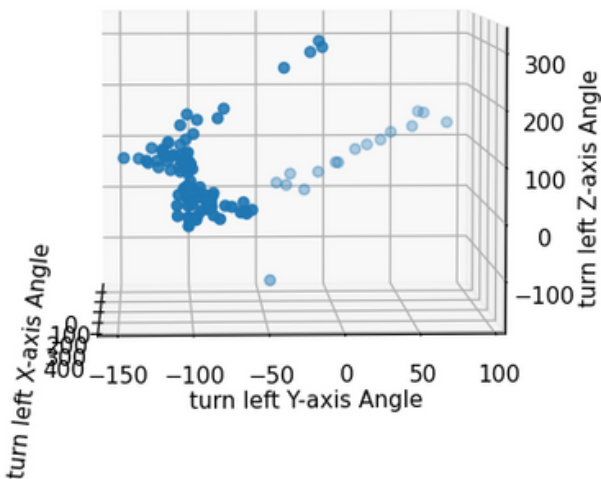
例如當車輛在右轉時，假設車輛全都是偏右，但可能我上一秒可能壓車，下一秒拉回一點角度，雖然整體看來都是偏右，但針對這兩秒來看其實是偏左。

# Fixes and Improvements

Q: To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

A: (老師要觀察 利用3軸或兩軸+時間，觀察資料散佈點)  
左轉時XYZ軸(3D圖)與X,Z,Time(3D圖):

X,Y變化量不大 (看似一些離群值)，主要為Z軸。



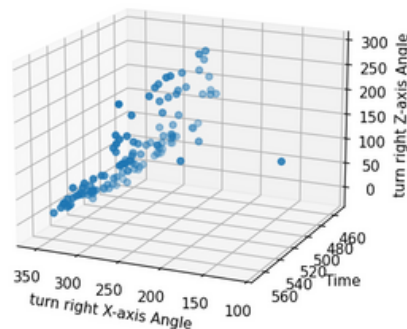
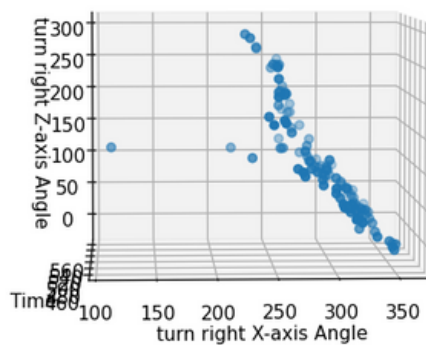
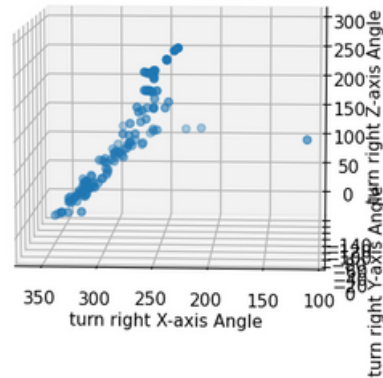
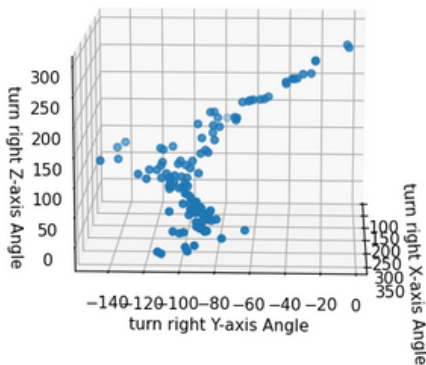
# Fixes and Improvements

Q: To improve the effectiveness of clustering in machine learning, I plan to observe the relevant features of the clusters in my experiments

A:

右轉時XYZ軸(3D圖)與X,Z,Time(3D圖):

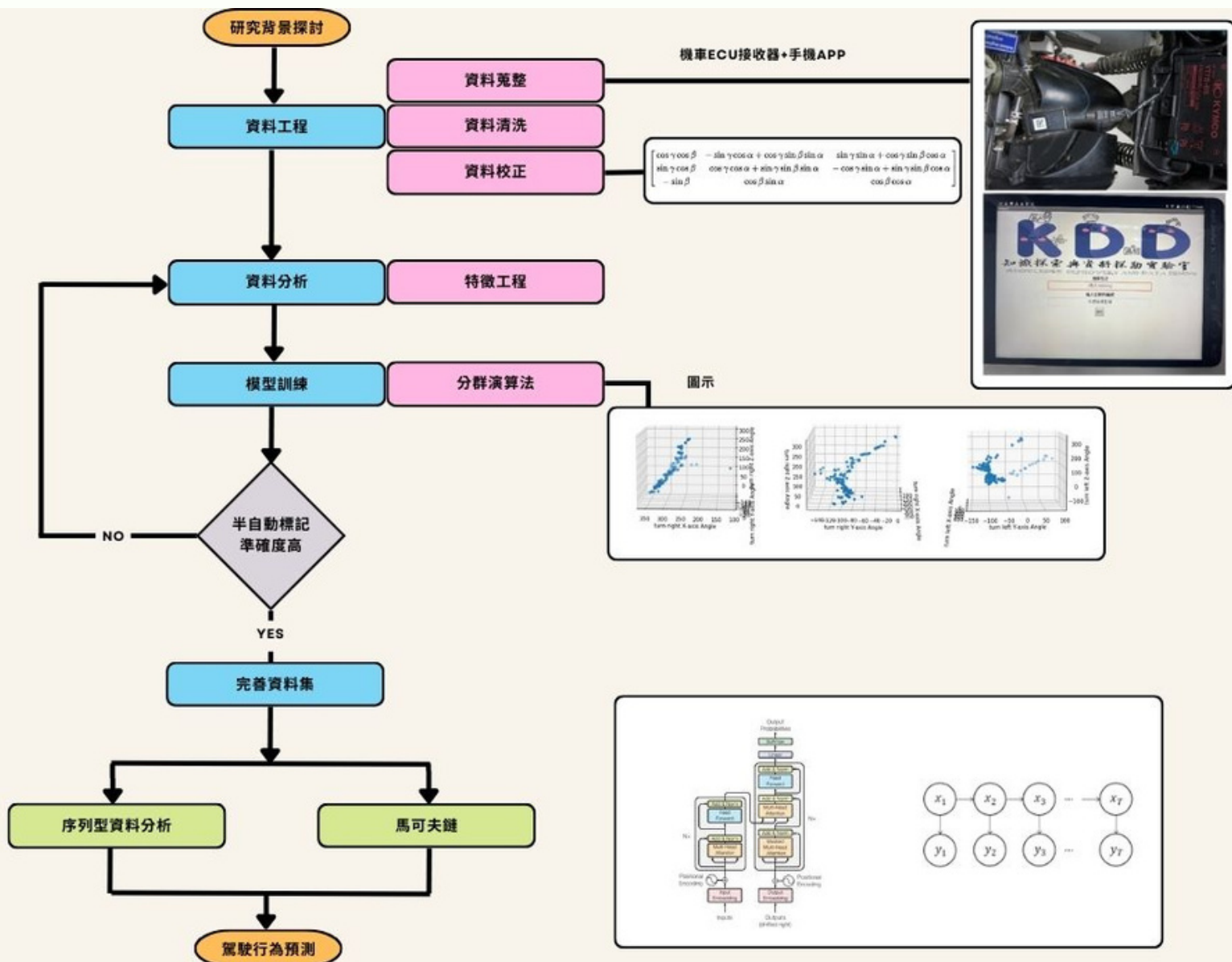
X,Y變化量不大 (看似一些離群值)，主要為Z軸。



# Fixes and Improvements

Q: The flow chart needs to be modified and made according to the manufacturing specification

A:



# Progress this week

- 測試分群效果
- 實驗確認轉換矩陣正確性
- 找論文
- 美化一下步驟圖
- 整合程式碼