AI臉部辨識化妝品推薦系統

陳冠宇

目錄

負責內容:

1. 資料清整
2. 資料分析EDA

   --資料視覺化

   --數據代表性與關聯

3. 建立模型與優化

WorkFlow

- 定義領域目標
- 資料來源選擇

- 定義資料分析問題與目標
- 策略擬定

- 排除異常值
- 修正格式

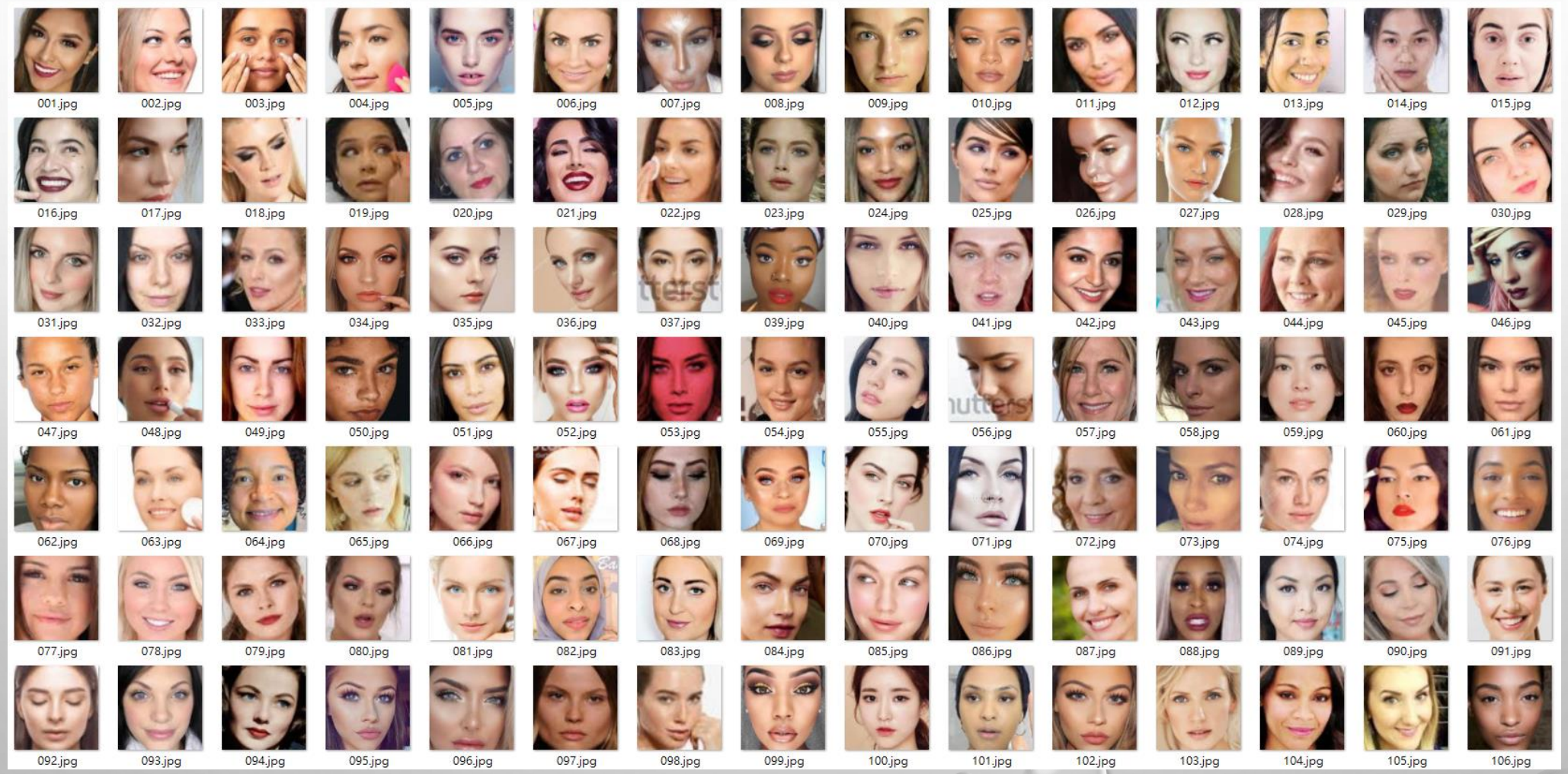
- 資料整併
- 資料轉換

- 資料分析
- 建立模型

- 視覺化呈現
- 得出結果

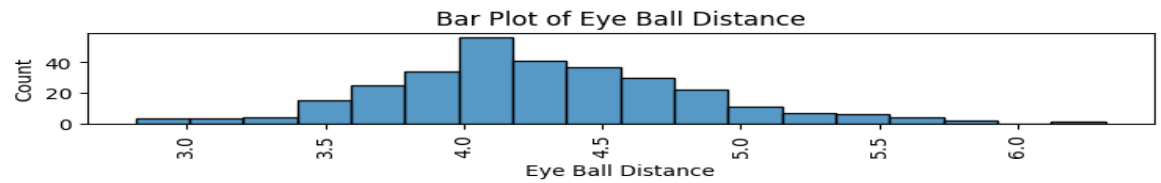
Domain Knowledge

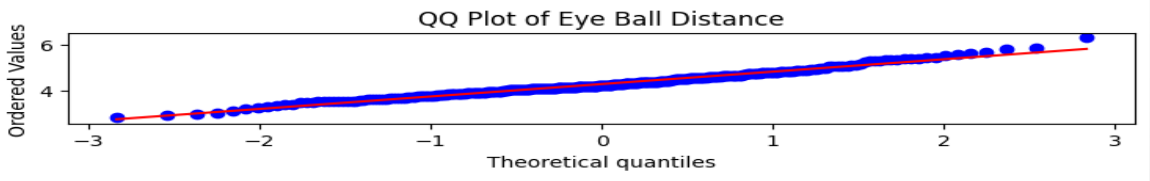
資料型態與來源

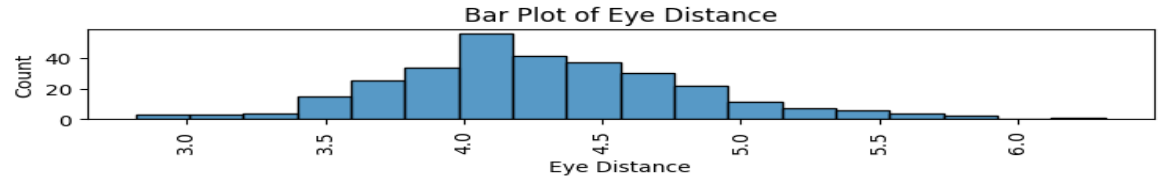


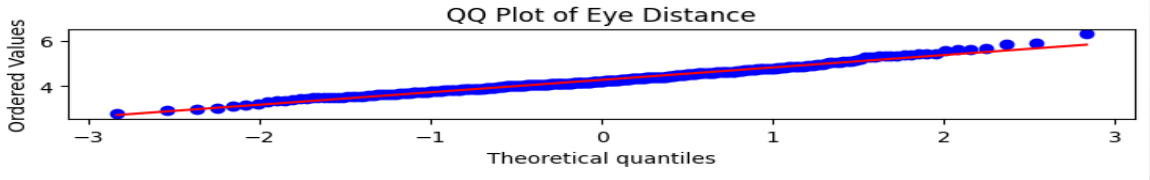
https://www.kaggle.com/datasets/petersunga/make-up-vs-no-make-up

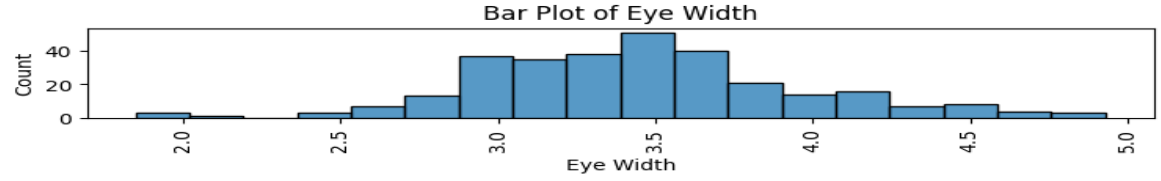
資料特徵分析

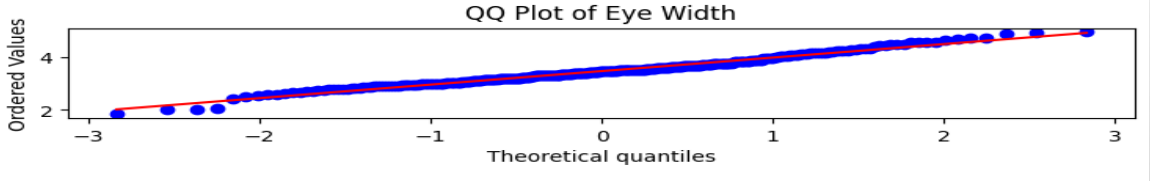

Bar Plot of Eye Ball Distance
Count
Eye Ball Distance

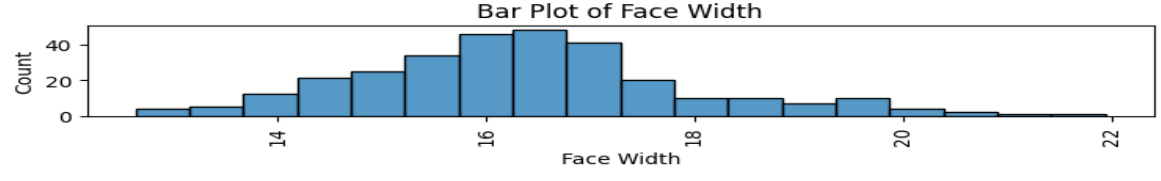

QQ Plot of Eye Ball Distance
Ordered Values
Theoretical quantiles

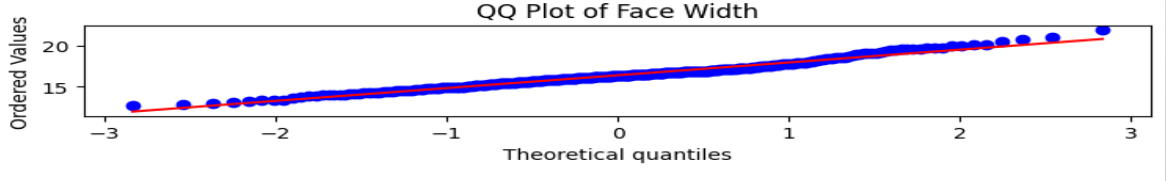

Bar Plot of Eye Distance
Count
Eye Distance

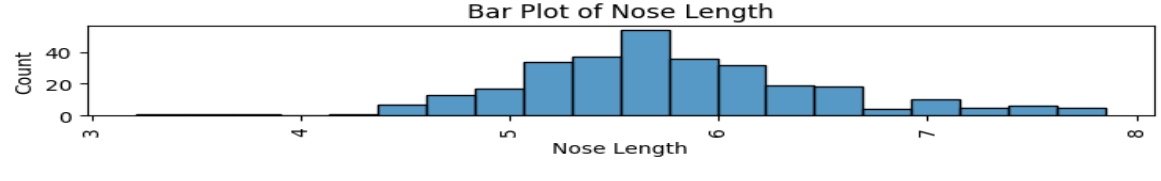

QQ Plot of Eye Distance
Ordered Values
Theoretical quantiles

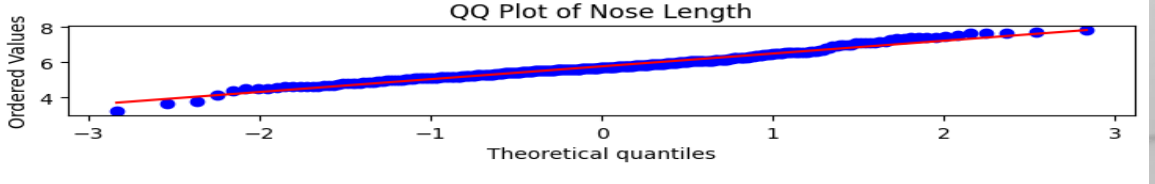

Bar Plot of Eye Width
Count
Eye Width

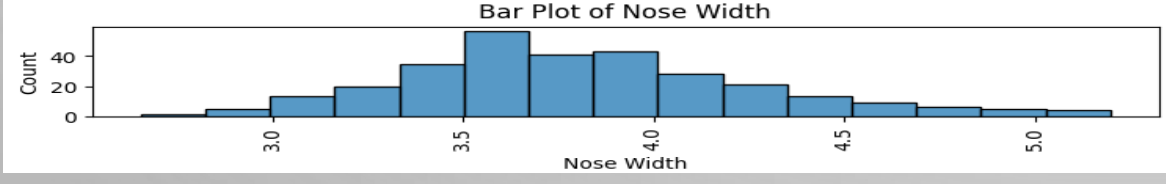

QQ Plot of Eye Width
Ordered Values
Theoretical quantiles

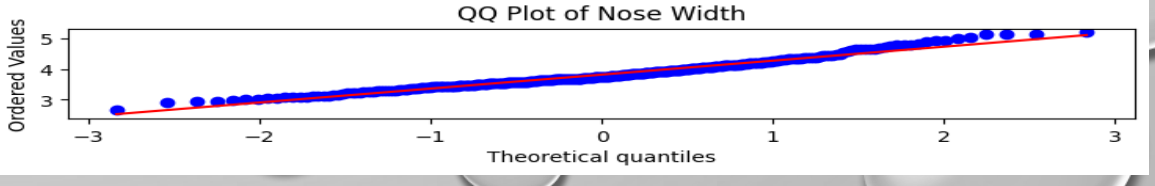

Bar Plot of Face Width
Count
Face Width


QQ Plot of Face Width
Ordered Values
Theoretical quantiles

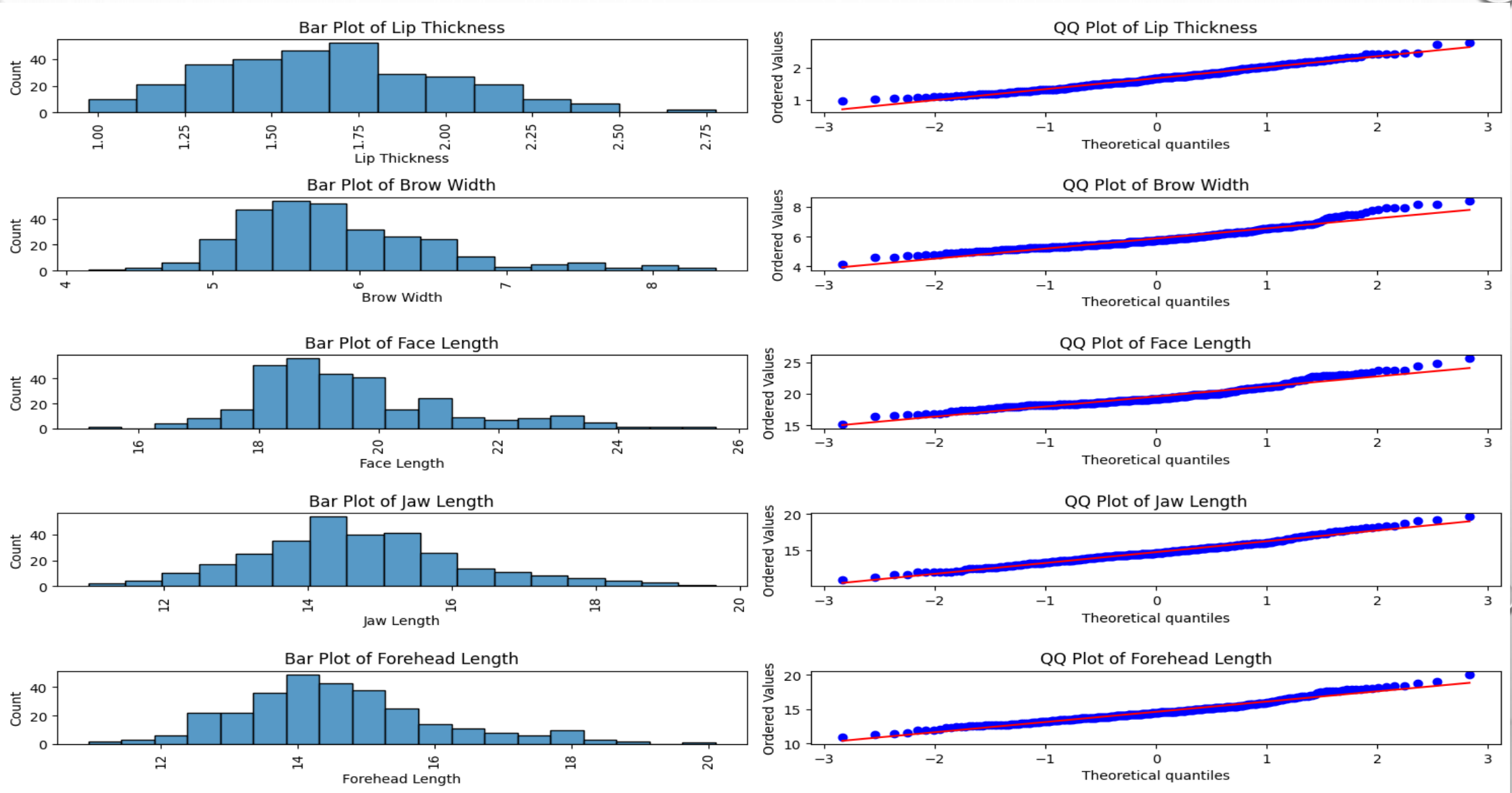

Bar Plot of Nose Length
Count
Nose Length


QQ Plot of Nose Length
Ordered Values
Theoretical quantiles

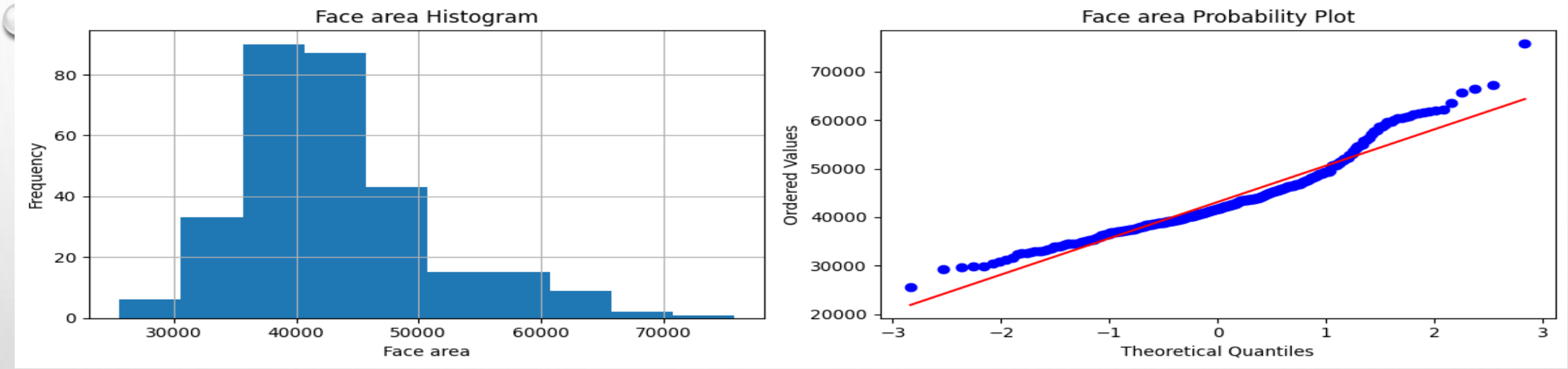

Bar Plot of Nose Width
Count
Nose Width

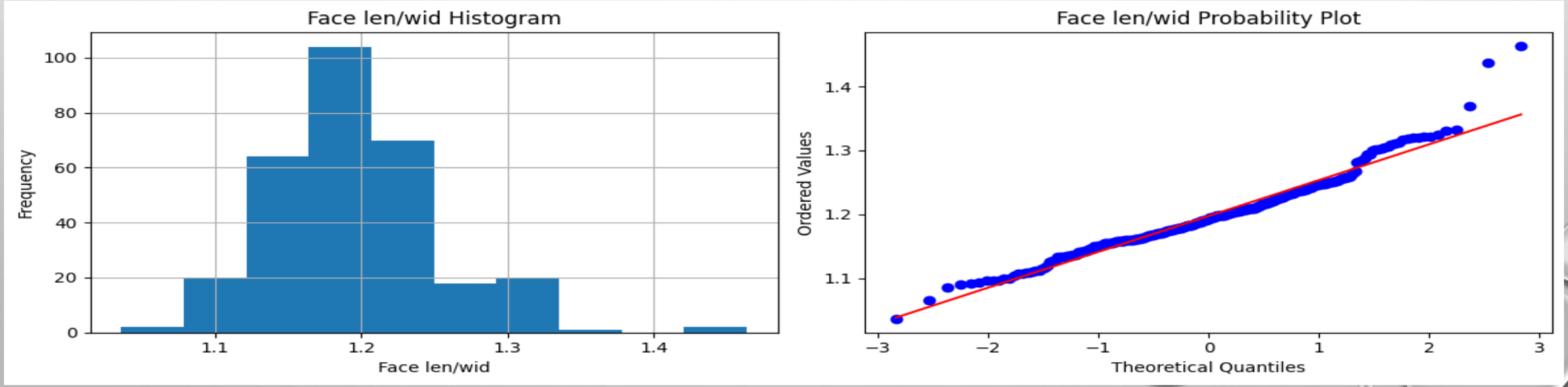

QQ Plot of Nose Width
Ordered Values
Theoretical quantiles

資料特徵分析


Bar Plot of Lip Thickness
Count
Lip Thickness
QQ Plot of Lip Thickness
Ordered Values
Theoretical quantiles
Bar Plot of Brow Width
Count
Brow Width
QQ Plot of Brow Width
Ordered Values
Theoretical quantiles
Bar Plot of Face Length
Count
Face Length
QQ Plot of Face Length
Ordered Values
Theoretical quantiles
Bar Plot of Jaw Length
Count
Jaw Length
QQ Plot of Jaw Length
Ordered Values
Theoretical quantiles
Bar Plot of Forehead Length
Count
Forehead Length
QQ Plot of Forehead Length
Ordered Values
Theoretical quantiles

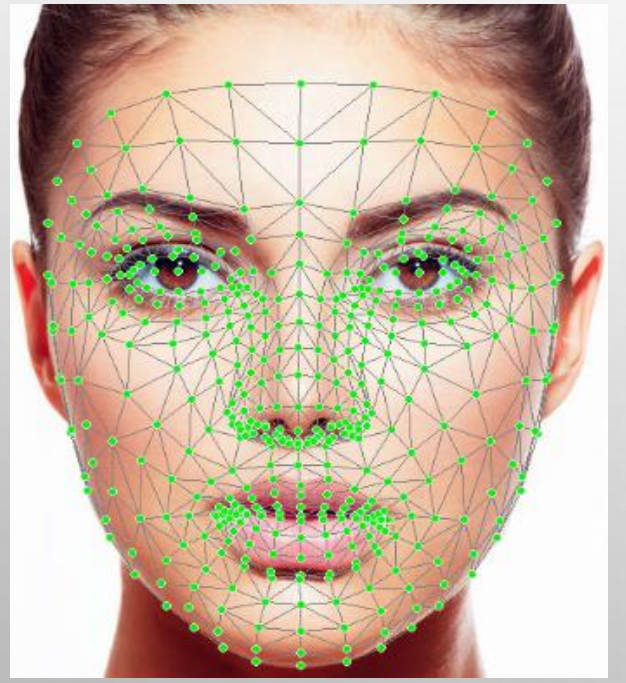
資料特徵分析


Face area Histogram
Frequency
Face area
0
20
40
60
80
30000
40000
50000
60000
70000
Face area Probability Plot
Ordered Values
Theoretical Quantiles
20000
30000
40000
50000
60000
70000
−3
−2
−1
0
1
2
3

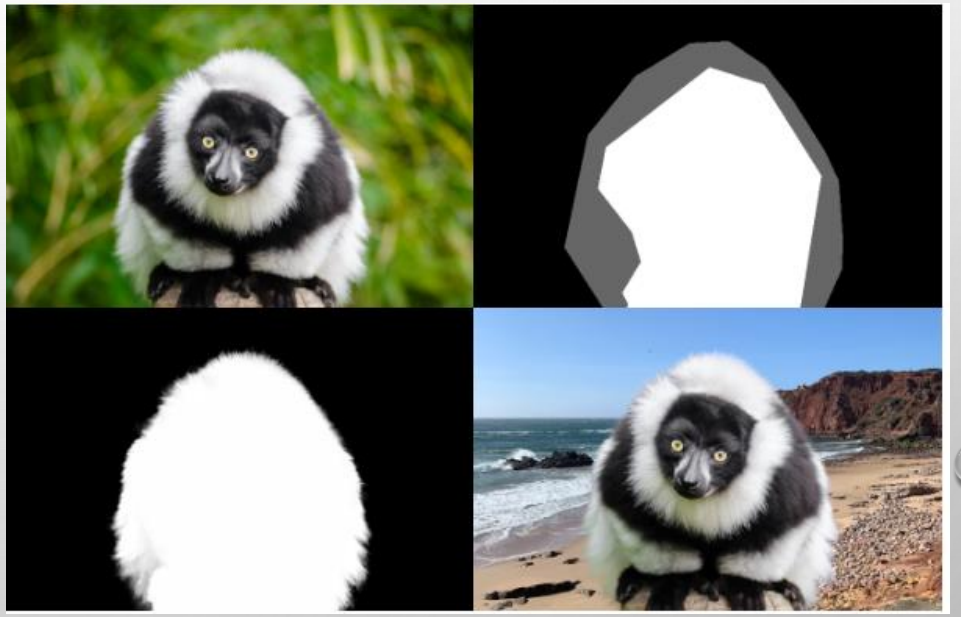

Face len/wid Histogram
Frequency
Face len/wid
0
20
40
60
80
100
1.1
1.2
1.3
1.4
Face len/wid Probability Plot
Ordered Values
Theoretical Quantiles
1.1
1.2
1.3
1.4
−3
−2
−1
0
1
2
3

化妝區域辨識：工作流程

1. 臉部不變特徵取出：MEDIAPIPE
2. 透過去背套件取出化妝區域：PYMATTING
3. 建立預測模型:AUTOENCODER



mediapipe



pymatting

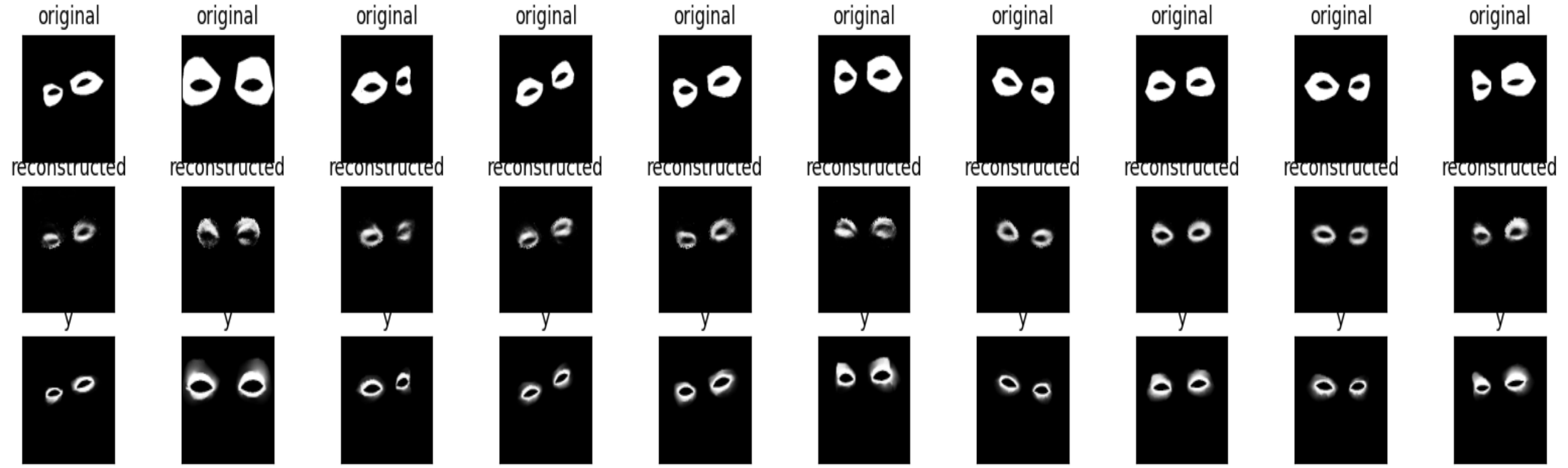
化妝區域提取流程

模型選擇

--預測眼妝區域

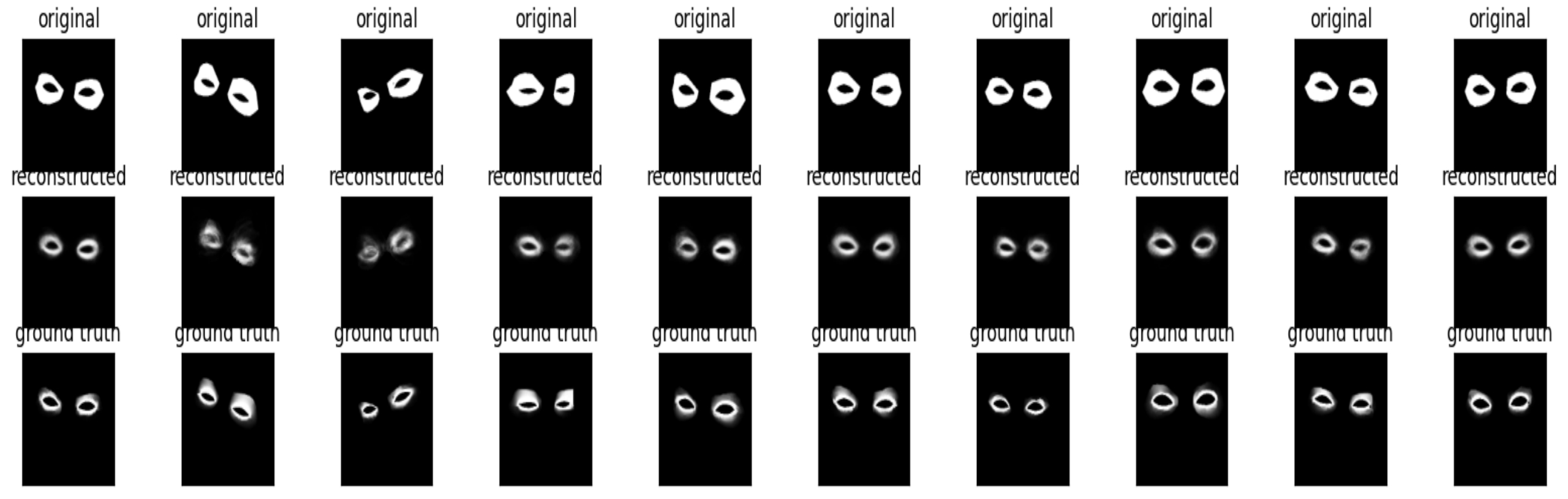
建立眼妝模型-*AUTOENCODER*

- 特徵提取（FEATURE EXTRACTION）
- 降維（DIMENSIONALITY REDUCTION）
- 生成模型（GENERATIVE MODELS）

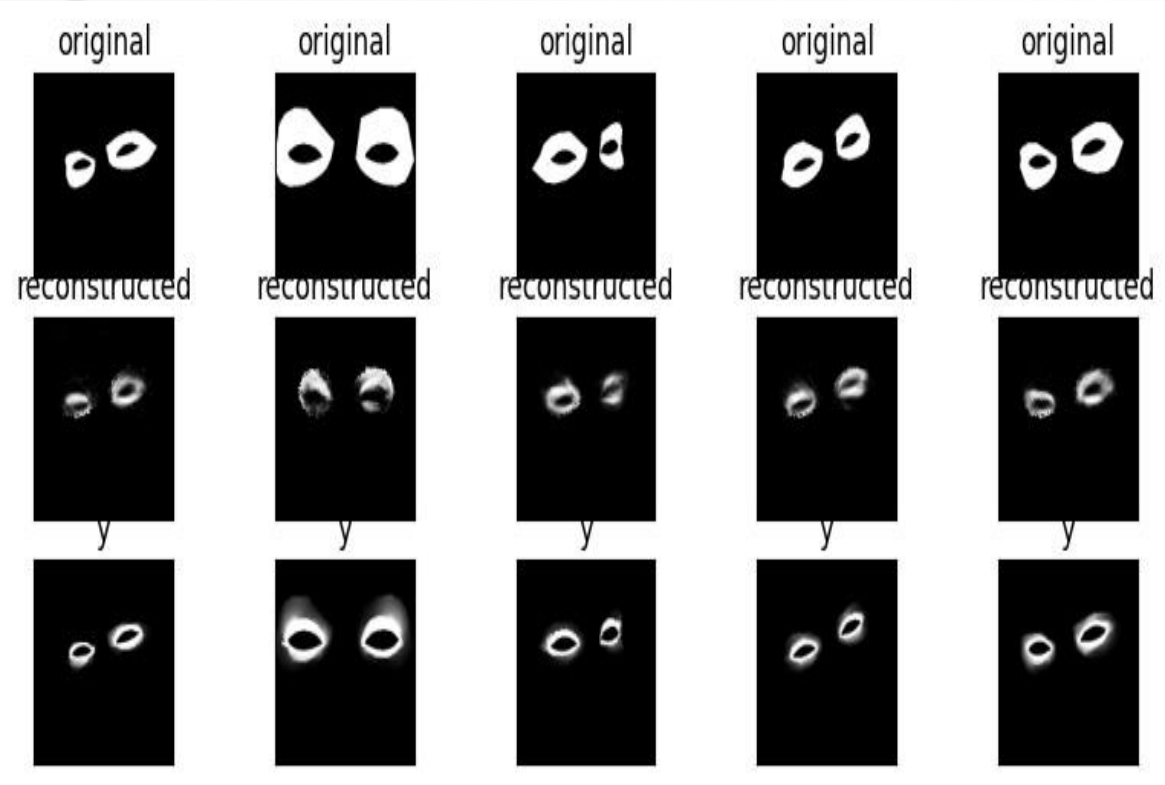


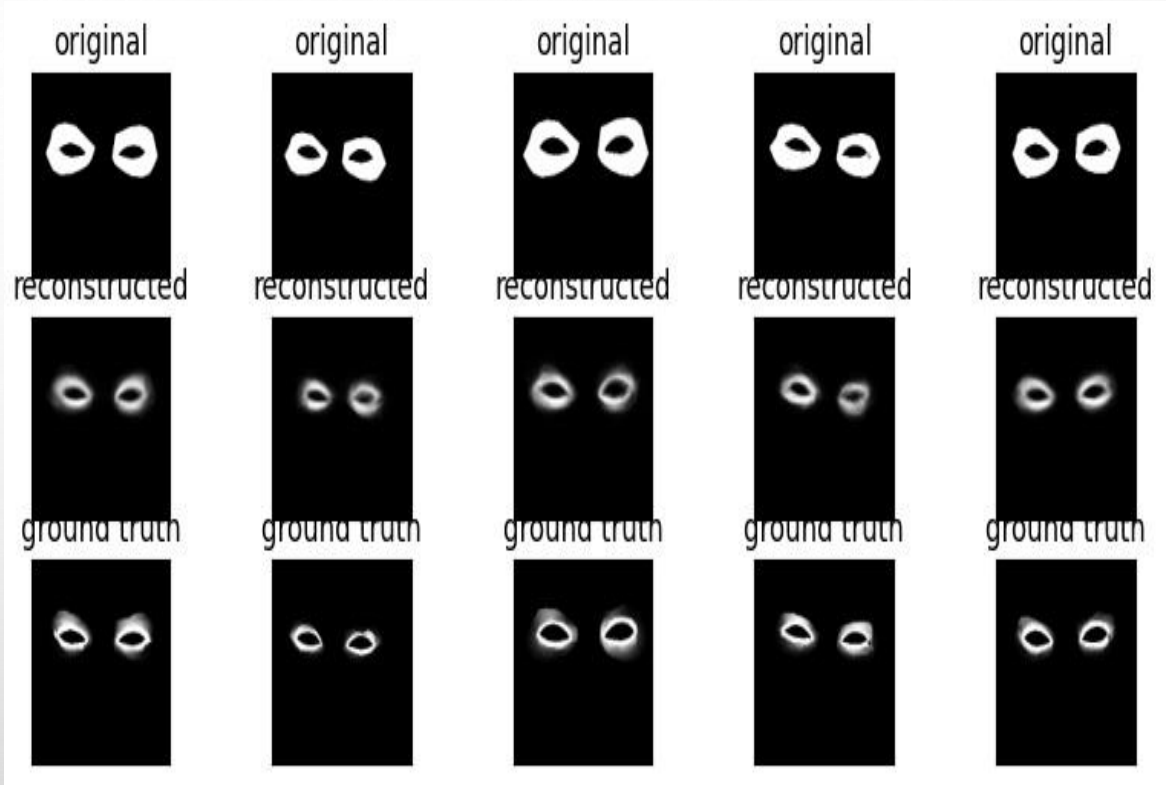
建立眼妝模型-*DENSENET* IN AUTOENCODER

- RESNET-IDENTITY MAPPING
- 自身的FEATURE-MAP傳遞給所有後續層
- 網絡可以更薄、具有較高的計算效率和記憶體效率



Autoencoder vs DenseNet





Autoencoder

DenseNet

MODEL EVOLUTION FLOW CHART

Autoencoder

The edges of the image are incomplete

VAE

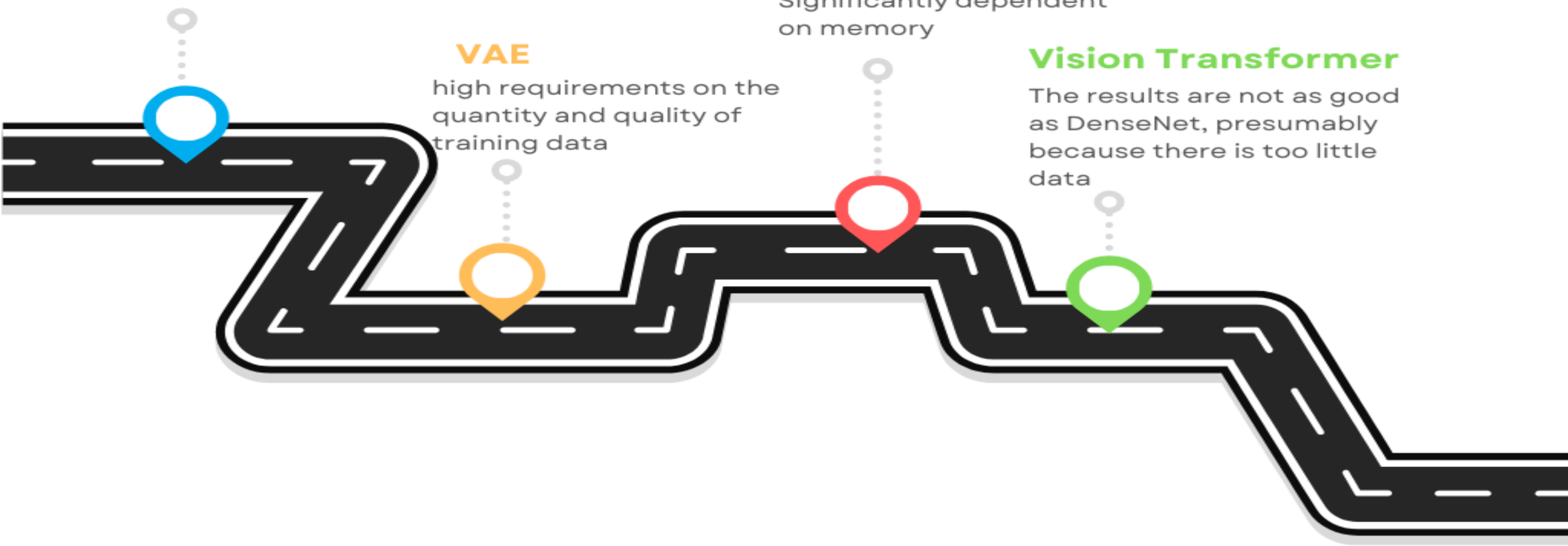
high requirements on the quantity and quality of training data

DenseNet

Significantly dependent on memory

Vision Transformer

The results are not as good as DenseNet, presumably because there is too little data



Discussion

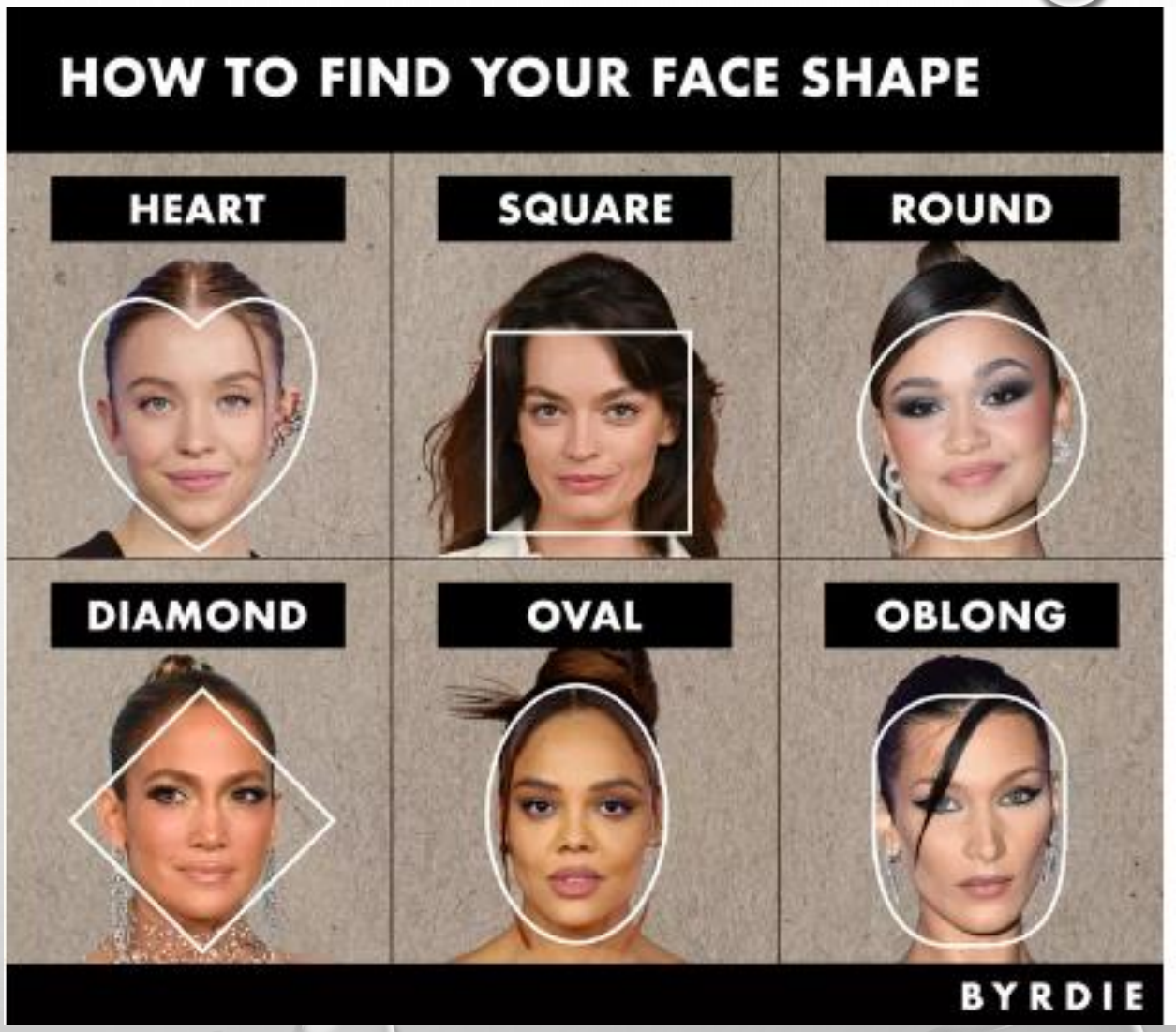
--研究限制與未來方向

討論

- 上色區域上眼影和下眼影不平均
- 不同臉型可能有不同化妝方法
- 現有模型即時辨識的可能性低
- 直接固定區域上妝的套件有什麼不同

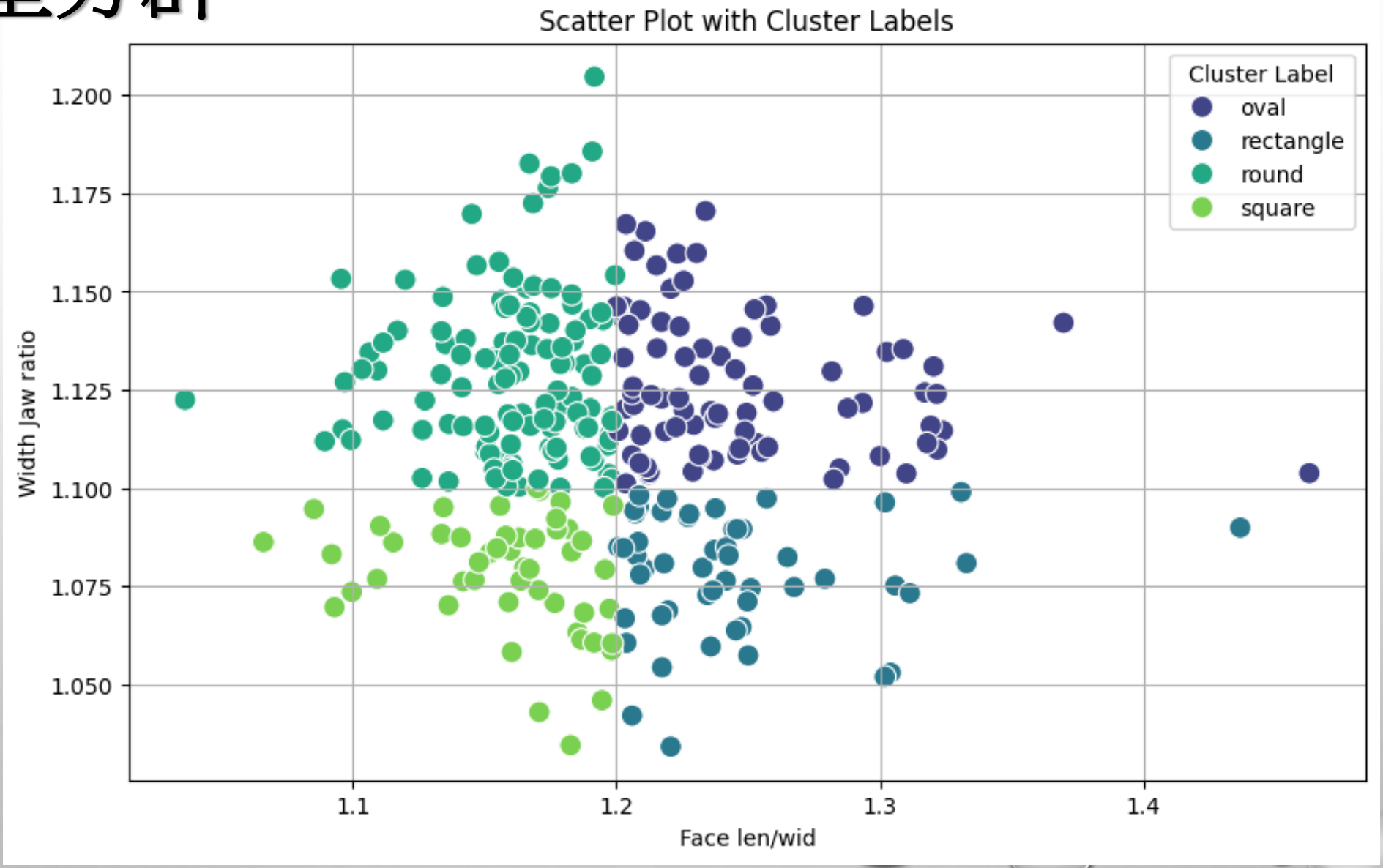
臉型分類

- THEIAB ALZAHRANI, WALEED AL-NUAIMY, AND BAIDAA AL-BANDER(2021)



https://www.byrdie.com/is-your-face-round-square-long-heart-or-oval-shaped-345761

臉型分群


Scatter Plot with Cluster Labels
Cluster Label
oval
rectangle
round
square
Width Jaw ratio
1.200
1.175
1.150
1.125
1.100
1.075
1.050
1.1
1.2
1.3
1.4
Face len/wid

臉型分群

Cluster Label

- round
- square
- oval
- rectangle

總結

- **ACTION**-透過AI技術解決需親自到品牌專櫃試妝的不便
- **BENEFIT**-藉由便利性和新奇的體驗來推廣品牌和增加銷售量
- **CONCLUSION**-增加資料集數目、未來會朝向區分臉型各別訓練的方式和優化模型

參考資料

- 化妝DATASETS
- HTTPS://WWW.KAGGLE.COM/DATASETS/PETERSUNGA/MAKE-UP-VS-NO-MAKE-UP
- PYMATTING:
- HTTPS://PYMATTING.GITHUB.IO/
- AUTOENCODER:
- //JASON-CHEN-1992.WEEBLY.COM/HOME/-AUTOENCODER
- HTTPS://ITHELP.ITHOME.COM.TW/ARTICLES/10206869
- DENSENET:
- HTTPS://MEDIUM.COM/IMAGE-PROCESSING-AND-ML-NOTE/DENSENET-DENSE-CONVOLUTIONAL-NETWORK-IMAGE-CLASSIFICATION-5DE397286C05
- 臉型分類:
- HTTPS://WWW.BYRDIE.COM/IS-YOUR-FACE-ROUND-SQUARE-LONG-HEART-OR-OVAL-SHAPED-345761

Thank you for attention!