



# TOPIC: Face Detection

Final Report

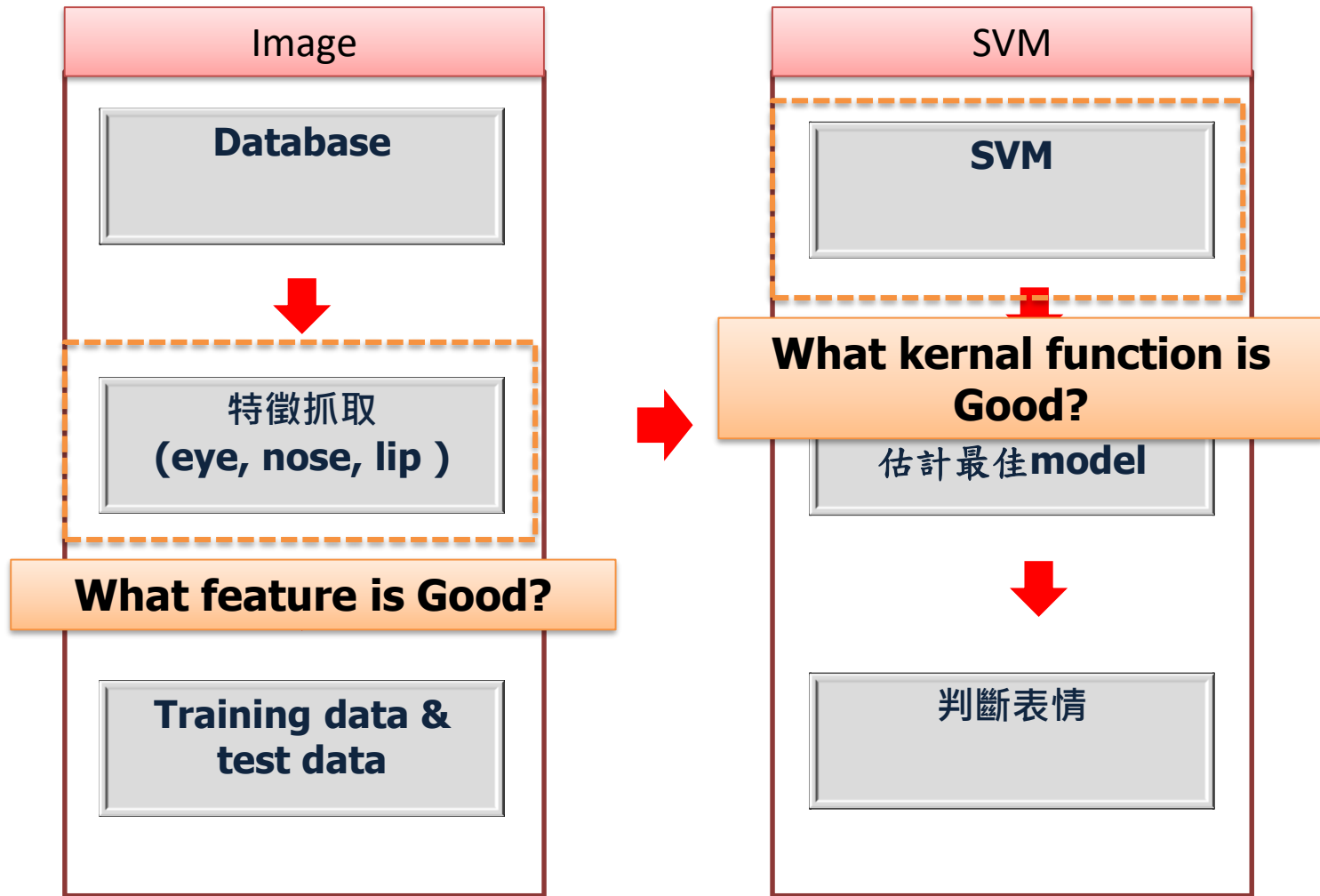
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2012/1/9

# OUTLINE

- Flow diagram
- Result
  - ✓ Accuracy Comparison
- Problem
- Conclusion

# Flow diagram



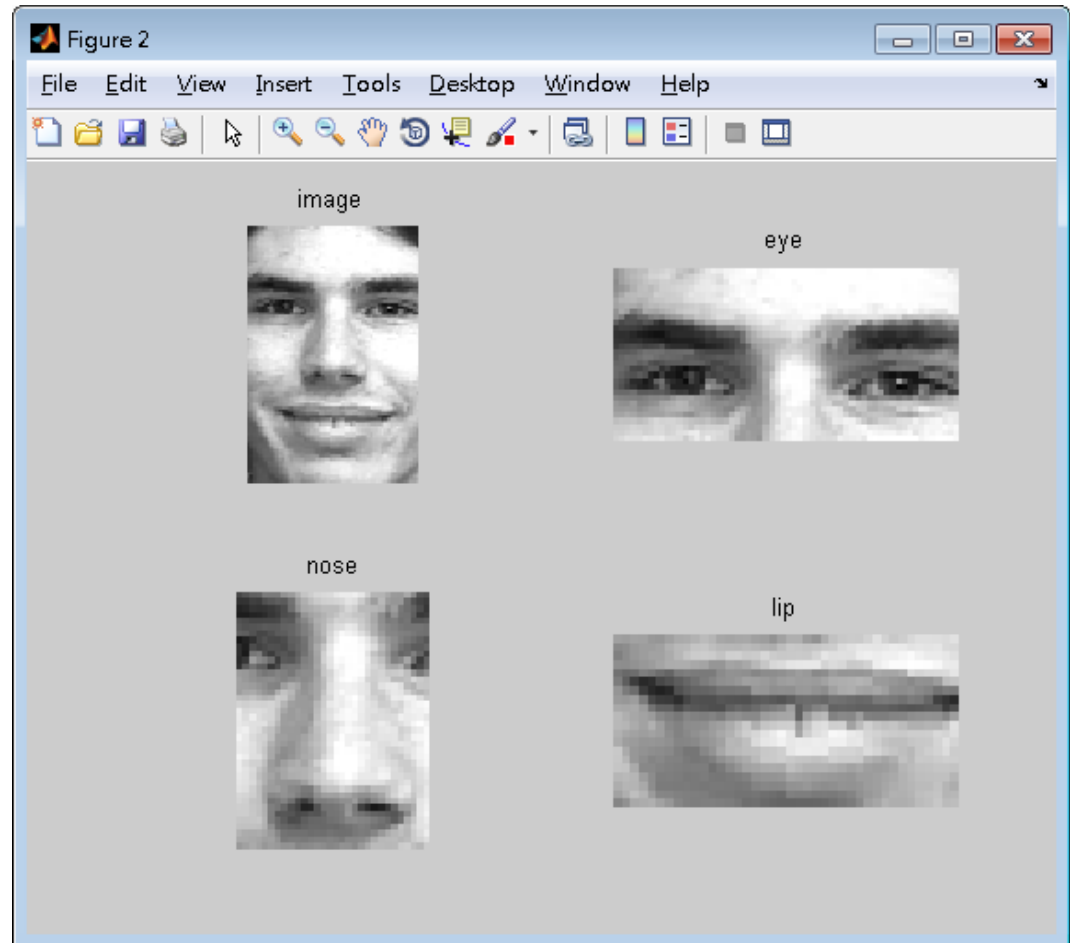
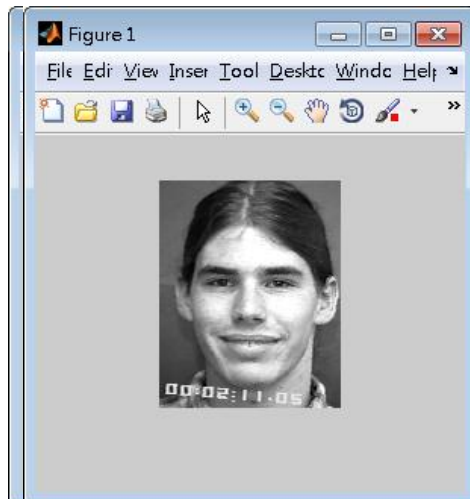
# Database

- 6 種表情: 75張圖
  - ✓ NE = No expression
  - ✓ AN = angry
  - ✓ DI = Disgust
  - ✓ FE = Fear
  - ✓ HA = Happy
  - ✓ SU = Surprise



# 特徵抓取

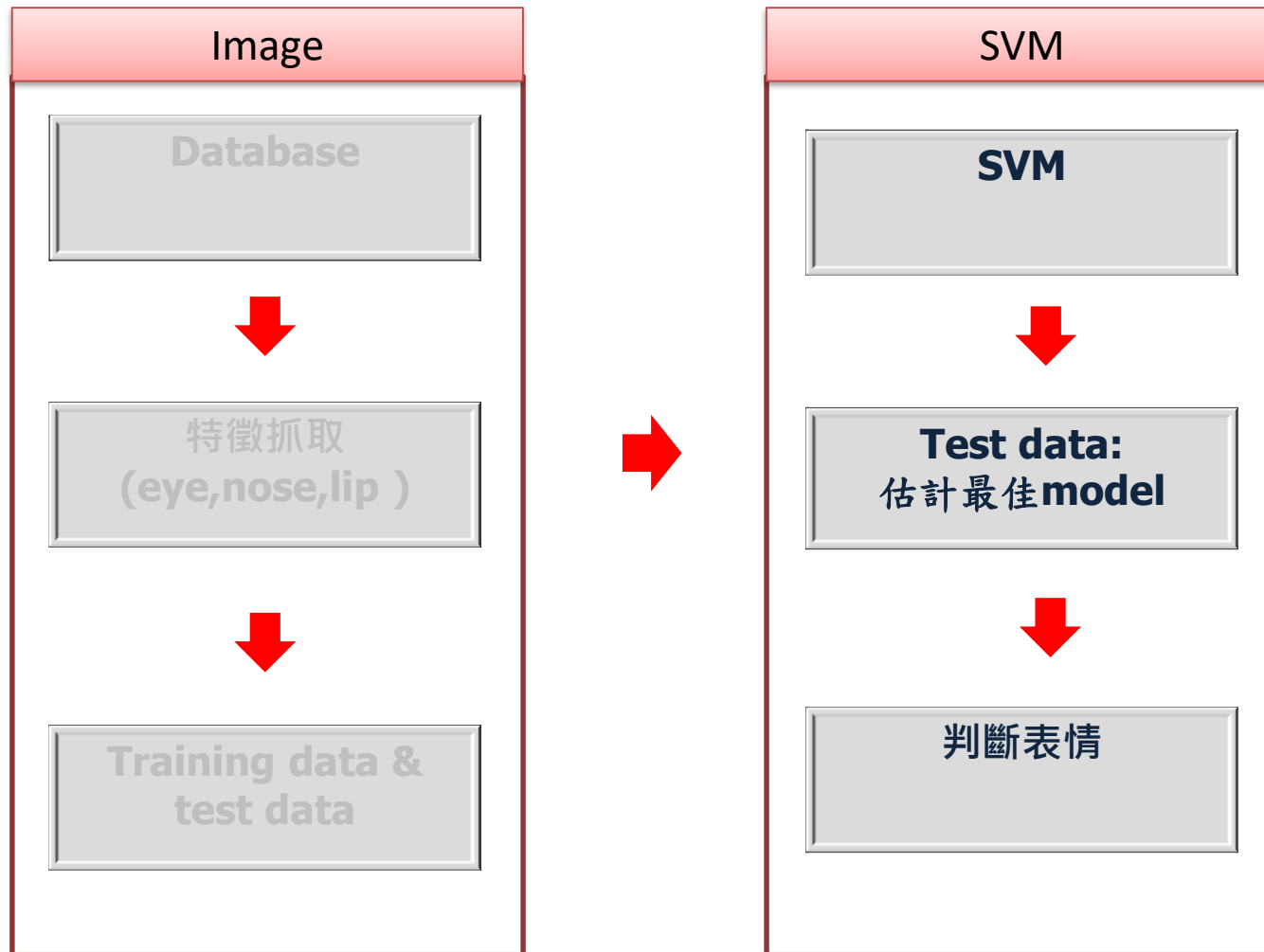
- Image: 3 part
  - ✓ Eye
  - ✓ Nose
  - ✓ Lip



# Training data & test data

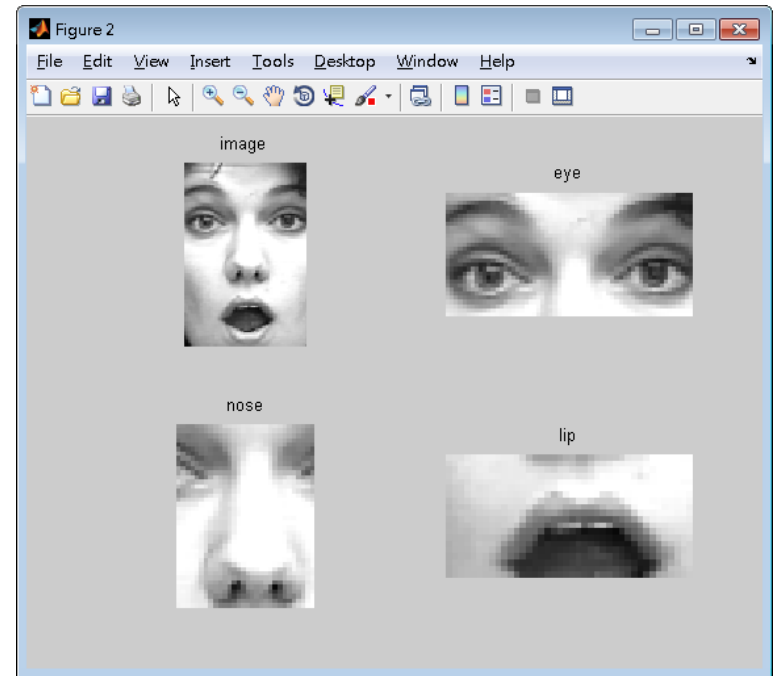
- Training data:
  - ✓ 50 image for 6 expression
- Testing data:
  - ✓ 25 image for 6 expression
- Kernal function:
  - ✓ RGB

# Flow diagram



# SVM training & predict the best model

- The training data for model
  - ✓ Eye+Nose+Lip
  - ✓ Eye
  - ✓ Nose
  - ✓ Lip
  - ✓ Face image





# SVM training & predict the best model

- The best model for Eye
  - ✓ **No expression** has the **0 %** accuracy
    - the cost function is  $2^{-16}$ , and the gamma is  $2^{-6}$
  - ✓ **Angry** has the **4 %** accuracy
    - the cost function is  $2^{-10}$ , and the gamma is  $2^2$
  - ✓ **Disgust** has the **4 %** accuracy
    - the cost function is  $2^{-9}$ , and the gamma is  $2^1$
  - ✓ **Fear** has the **28 %** accuracy
    - the cost function is  $2^{-8}$ , and the gamma is  $2^2$
  - ✓ **Happy** has the **76 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^0$
  - ✓ **Surprise** has the **88 %** accuracy
    - the cost function is  $2^{-8}$ , and the gamma is  $2^{-1}$

# SVM training & predict the best model

- The best model for Nose
  - ✓ **No expression** has the **0 %** accuracy
    - the cost function is  $2^{-16}$ , and the gamma is  $2^{-6}$
  - ✓ **Angry** has the **4 %** accuracy
    - the cost function is  $2^{-10}$ , and the gamma is  $2^3$
  - ✓ **Disgust** has the **4 %** accuracy
    - the cost function is  $2^{-9}$ , and the gamma is  $2^3$
  - ✓ **Fear** has the **28 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^3$
  - ✓ **Happy** has the **76 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^1$
  - ✓ **Surprise** has the **76 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^0$

# SVM training & predict the best model

- The best model for Lip
  - ✓ **No expression** has the **8 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^{-6}$
  - ✓ **Angry** has the **8 %** accuracy
    - the cost function is  $2^{-8}$ , and the gamma is  $2^0$
  - ✓ **Disgust** has the **4 %** accuracy
    - the cost function is  $2^{-10}$ , and the gamma is  $2^2$
  - ✓ **Fear** has the **0 %** accuracy
    - the cost function is  $2^{-16}$ , and the gamma is  $2^{-6}$
  - ✓ **Happy** has the **92 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^1$
  - ✓ **Surprise** has the **52 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^2$

# SVM training & predict the best model

- The best model for Eye+nose+lip
  - ✓ **No expression** has the **20 %** accuracy
    - the cost function is  $2^{-6}$ , and the gamma is  $2^0$
  - ✓ **Angry** has the **8 %** accuracy
    - the cost function is  $2^{-6}$ , and the gamma is  $2^{-1}$
  - ✓ **Disgust** has the **4 %** accuracy
    - the cost function is  $2^{-8}$ , and the gamma is  $2^2$
  - ✓ **Fear** has the **4 %** accuracy
    - the cost function is  $2^{-6}$ , and the gamma is  $2^2$
  - ✓ **Happy** has the **76 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^1$
  - ✓ **Surprise** has the **96 %** accuracy
    - the cost function is  $2^{-6}$ , and the gamma is  $2^1$

# SVM training & predict the best model

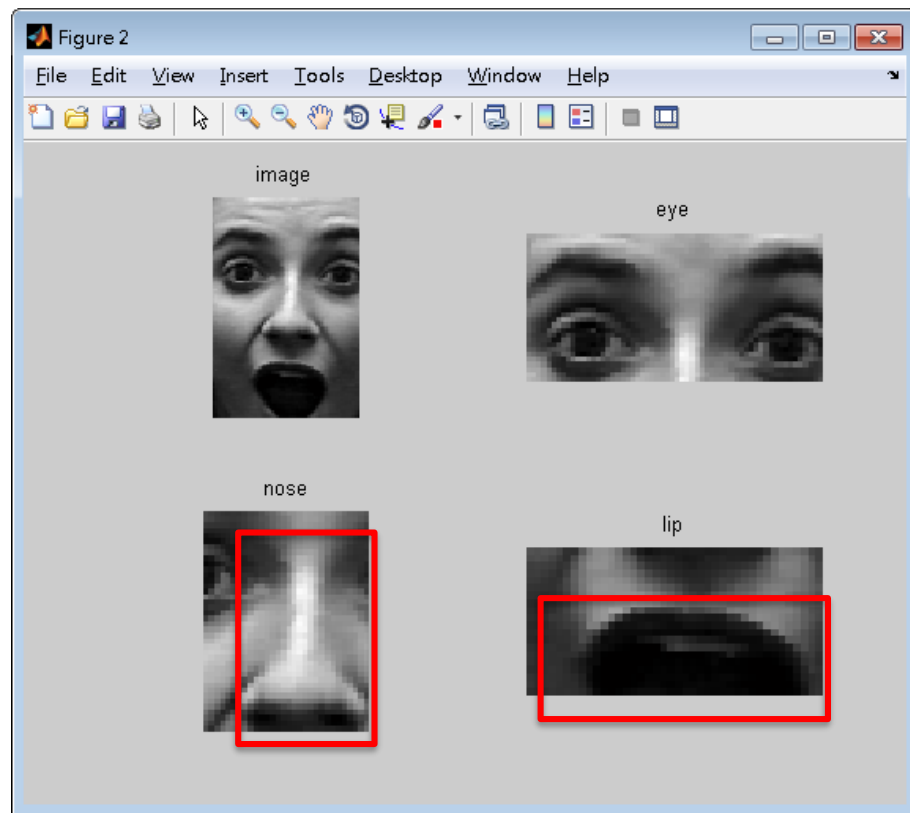
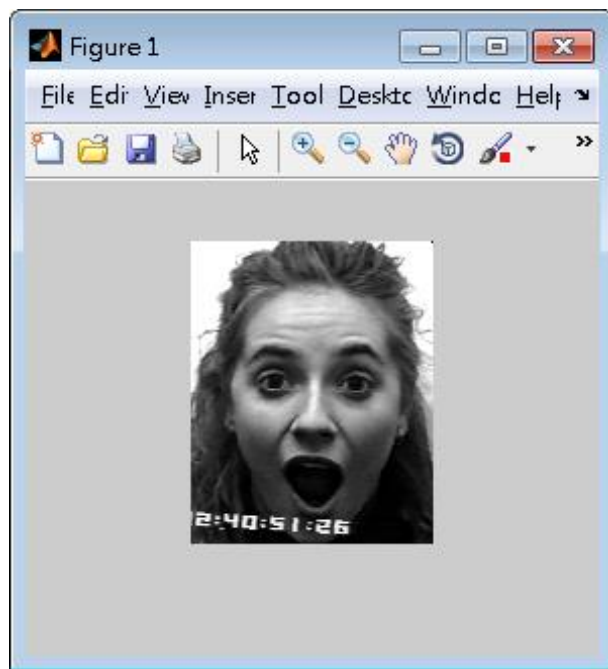
- The best model for face
  - ✓ **No expression** has the **20 %** accuracy
    - the cost function is  $2^{-8}$ , and the gamma is  $2^0$
  - ✓ **Angry** has the **20 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^{-1}$
  - ✓ **Disgust** has the **4 %** accuracy
    - the cost function is  $2^{-8}$ , and the gamma is  $2^1$
  - ✓ **Fear** has the **0 %** accuracy
    - the cost function is  $2^{-16}$ , and the gamma is  $2^{-6}$
  - ✓ **Happy** has the **68 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^{-2}$
  - ✓ **Surprise** has the **92 %** accuracy
    - the cost function is  $2^{-7}$ , and the gamma is  $2^1$

# Comparison

- Eye+nose+lip
    - Happy has the 76 % accuracy
    - Surprise has the 96 % accuracy
  - Eye Happy has the 76 % accuracy
    - Surprise has the 88 % accuracy
  - Nose
    - Happy has the 76 % accuracy
    - Surprise has the 76 % accuracy
- Lip
    - Happy has the 92 % accuracy
    - Surprise has the 52 % accuracy
  - face
    - Happy has the 68 % accuracy
    - Surprise has the 92 % accuracy

# Problem

- 無法完全抓到眼睛鼻子嘴巴等特徵
  - ✓ 特徵影像中心會偏移，導致data的誤差而影響SVM的訓練



# Conclusion

- 特徵抓取由SVM訓練後，可以得知快樂和驚喜在嘴巴、眼睛、鼻子等五官特徵最能夠有明顯差異的部分。
- 另外在利用SVM訓練時，利用不同的kernal function對於不同的表情擁有不同效果，在文獻上也看到linear kernal function 和polyomial kernal function對於高興與驚訝有不同的效果
  - ✓ 文獻上只有做高興、驚訝和閉眼，可能其他表情效果不佳



# Reference

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