圖形識別 HW4

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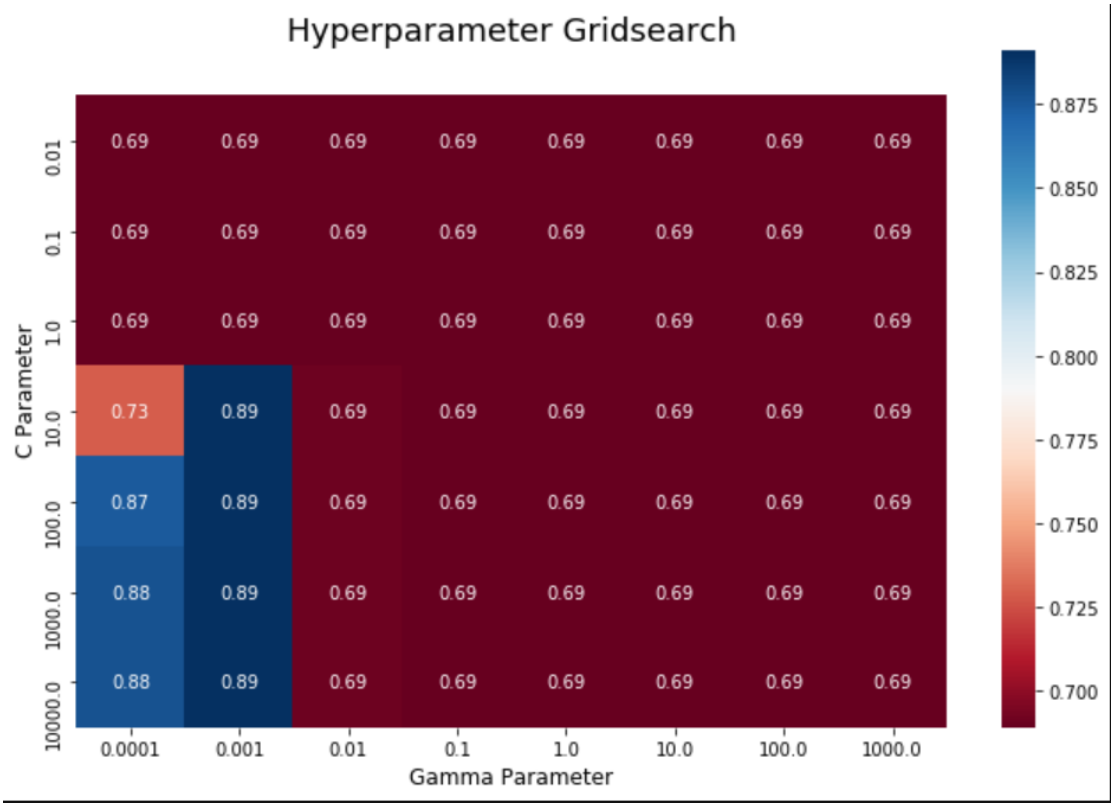
Part 1

1. Split: 1, Training index: [1 2 3 4 5 7 8 9 10 11 14 15 16 17 18 19],
Validation index: [0 6 12 13]
Split: 2, Training index: [0 2 3 4 5 6 8 11 12 13 14 15 16 17 18 19],
Validation index: [1 7 9 10]
Split: 3, Training index: [0 1 2 4 6 7 8 9 10 11 12 13 14 15 17 18],
Validation index: [3 5 16 19]
Split: 4, Training index: [0 1 2 3 4 5 6 7 9 10 12 13 16 17 18 19],
Validation index: [8 11 14 15]
Split: 5, Training index: [0 1 3 5 6 7 8 9 10 11 12 13 14 15 16 19],
Validation index: [2 4 17 18]

註:這每次會不一樣，因為是 shuffle 過的

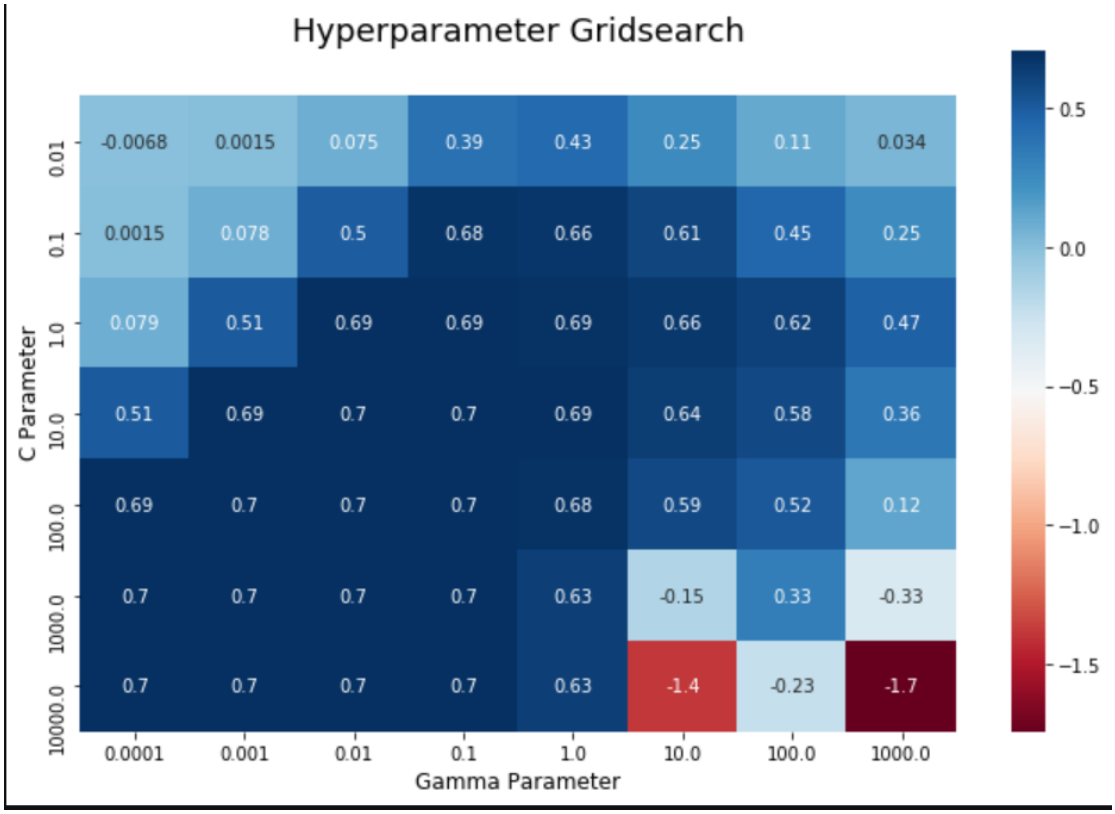
2. {'C': 10, 'gamma': 0.001}

3.



4. Accuracy score: 0.8958333333333334

5. {'C': 1000, 'gamma': 0.001}



註: 這裡使用的 score 不是 MSE，是 SVR 裡定義的 score，score = 1-(u/v)

u = ((y_true - y_pred) ** 2).sum()

v = ((y_true - y_true.mean()) ** 2).sum().

The best possible score is 1.0(when u is 0) and it can be negative (because the model can be arbitrarily worse).

Square error of Linear regression: 3.4339477869026385

Square error of SVM regresssion model: 3.6002184676788693

分析:這裡不管跑幾次都發現是 Linear regression 的 MSE 比較小

Part II

$$k(x, x') = c k_1(x, x')$$
$$= c(\phi(x)^T \phi(x'))$$
$$= (\sqrt{c}\phi(x))^T (\sqrt{c}\phi(x'))$$

$$k(x, x') = f(x) k_1(x, x') f(x')$$
$$= f(x)(\phi(x)^T \phi(x')) f(x')$$
$$= (f(x)\phi(x))^T ((f(x')\phi(x'))$$

$$\phi(x) = f(x)\phi(x)$$