Homework #3

Linear Discriminant

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Least Square

Implement Least square for Linear discriminant as follows.

1. Generate two groups of 2D random data. (Each group has 150 samples)

   - $(x_1, y_1) \sim (\mathcal{N}(3, 1^2), \mathcal{N}(1, 3^2))$

   - $(x_2, y_2) \sim (\mathcal{N}(-3, 1^2), \mathcal{N}(-1, 3^2))$

2. Use Least square, find $\widetilde{\mathbf{W}}$.

3. Plot data & decision boundary

4. Add some outliers (10 samples) - $(x_3, y_3) \sim (\mathcal{N}(5, 1^2), \mathcal{N}(3, 1^2))$ and repeat 2, 3.

Fisher's LDA

Use Fisher's linear discriminant, repeat above.

Hint: We know $\mathbf{w} \propto \mathbf{S_w^{-1}}(\mathbf{m_2} - \mathbf{m_1})$. With normalization, we can find true $\mathbf{w}$.

Helpful reference

- Bishop Chap 4
- https://adnoctum.tistory.com/442

RANSAC

RANSAC menas Random Sample Consensus. (Wiki)
It is much more robust than Least square.

Implement RANSAC and apply to parabola problem in https://darkpgmr.tistory.com/61.