

STA4042 24-25T1 Quiz 2

November, 4th

SVM (10 + 10 + 10 + 10 + 20 + 15 + 15 + 10 = 100 **points**)

- Introduce the setting of large (or hard) margin Support vector machines (SVM).
- Justify the formulation of $f(x) = w^T + w_0$ (equal to 0 on the decision boundary, positive on one side and negative on the other).
- Explain why it is called a large margin classifier and how it expresses the objective function.
- Express the primal problem.
- Explain how we go from the primal to the dual problem with the introduction of the Lagrangian (in particular, provide all the KKT conditions and the new dual optimisation problem).
- Justify the existence of support vectors and how they allow us to simplify the final expression of the prediction.
- Explain how w and w_0 are calculated from α .
- Explain how we go from a linear boundary to a non-linear boundary thanks to a kernel method (on the slides it is only done for the soft boundary classifier, but the extension is similar for the large boundary classifier).