Assignment 04

To be solved individually

Submit by 9 Dec, 2018, 23h59 by email to jaime.cardoso@fe.up.pt

1. Modify the code (script myProject.m / myProject.py) provided in lecture 6. For the SVM model and splitting the given data in suitable subsets:

-make sure the kernel is set to RBF.

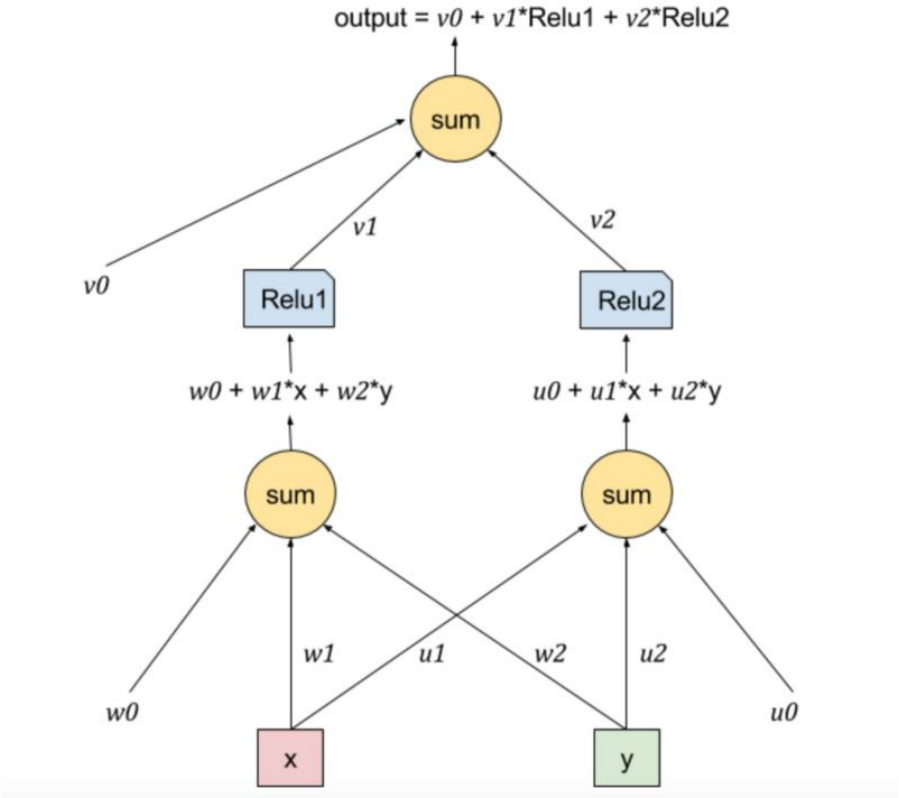
-simultaneously optimize the gamma in the set {0.5, 1, 2} and the C parameter in the set {1/4, 1/2, 1, 2, 4, 8}

a. What's the selected optimal set of parameters {gamma, C}?

b. What's the estimated performance for the chosen parameterization?

Provide explicitly the results obtained and the Matlab/Python code supporting your answers.

2. Neural networks
Consider the following neural network, where the activation functions in the first layer are ReLUs and are linear in the output.



Assume the initial values $w_0 = +5$, $w_1 = -2$, $w_2 = +1$.
Assume the initial values $u_0 = -5$, $u_1 = +2$, $u_2 = +1$.
Assume the initial values $v_0 = 1$, $v_1 = 1$, $v_2 = 1$.

a) If we remove the ReLU activation functions, what model do we get?

b) Indicate the values of the w_1, u_1, v_1 after the one iteration of back-propagation (each iteration corresponding to the processing of one data point). In your computations use the learning rate $\eta = 0.3$ and the dataset $D = \{([1, 0.1]^T, 2.3); ([-0.5, 1]^T, 1.1)\}$, and as loss function the squared error.

3. Research a bit about support tensor machine and variations. Summarize in at most one page the main ideas, advantages/disadvantages over SVM, when one should prefer one over the other, etc. List the references supporting your summary.