Classification using Neural Network: Basketball vs Football Players

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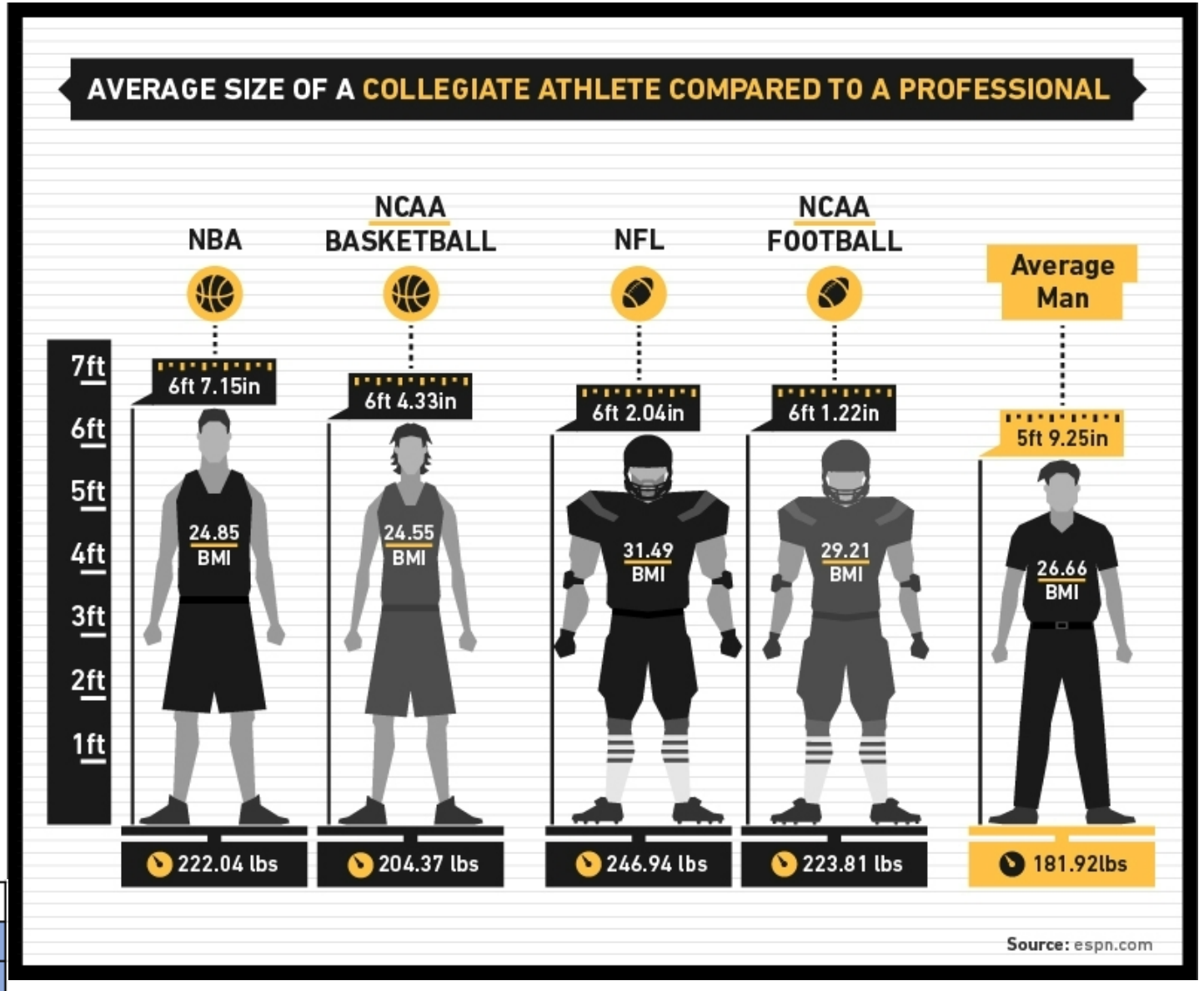
Task at hand:

Designing a neural network that classifies various points in two categories using M- dimensional feature vectors.

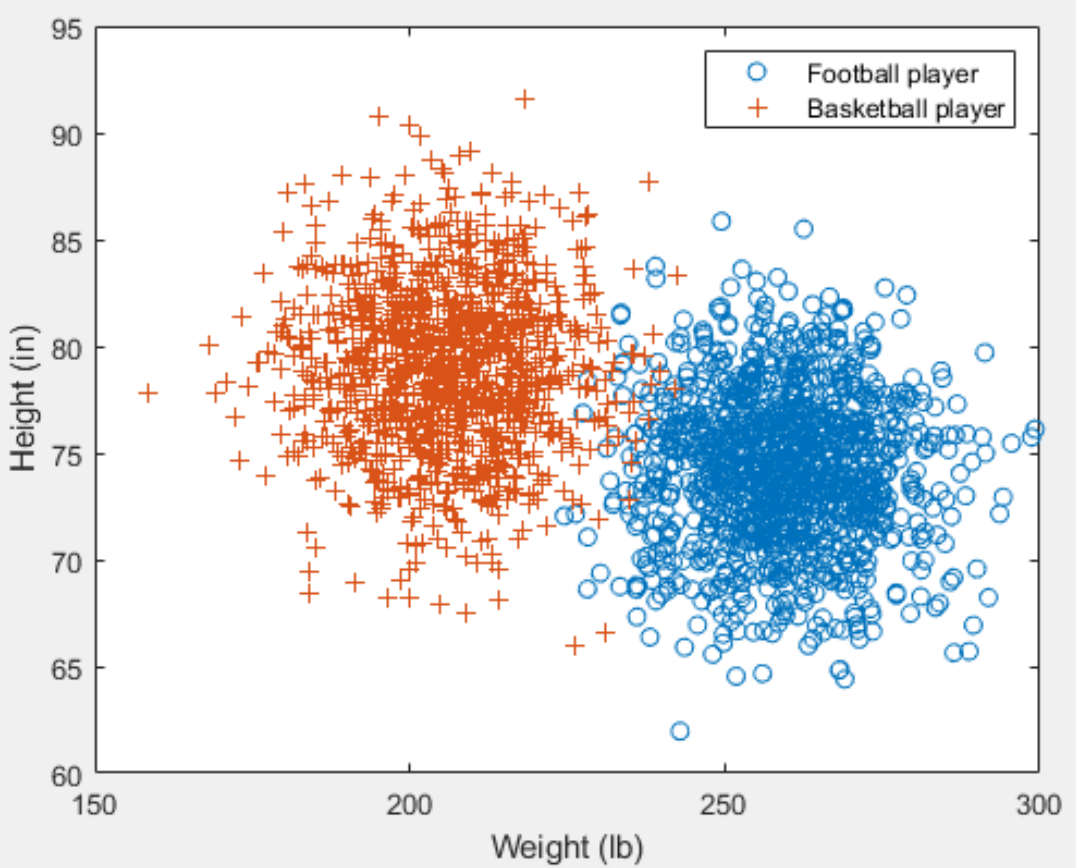
Data used

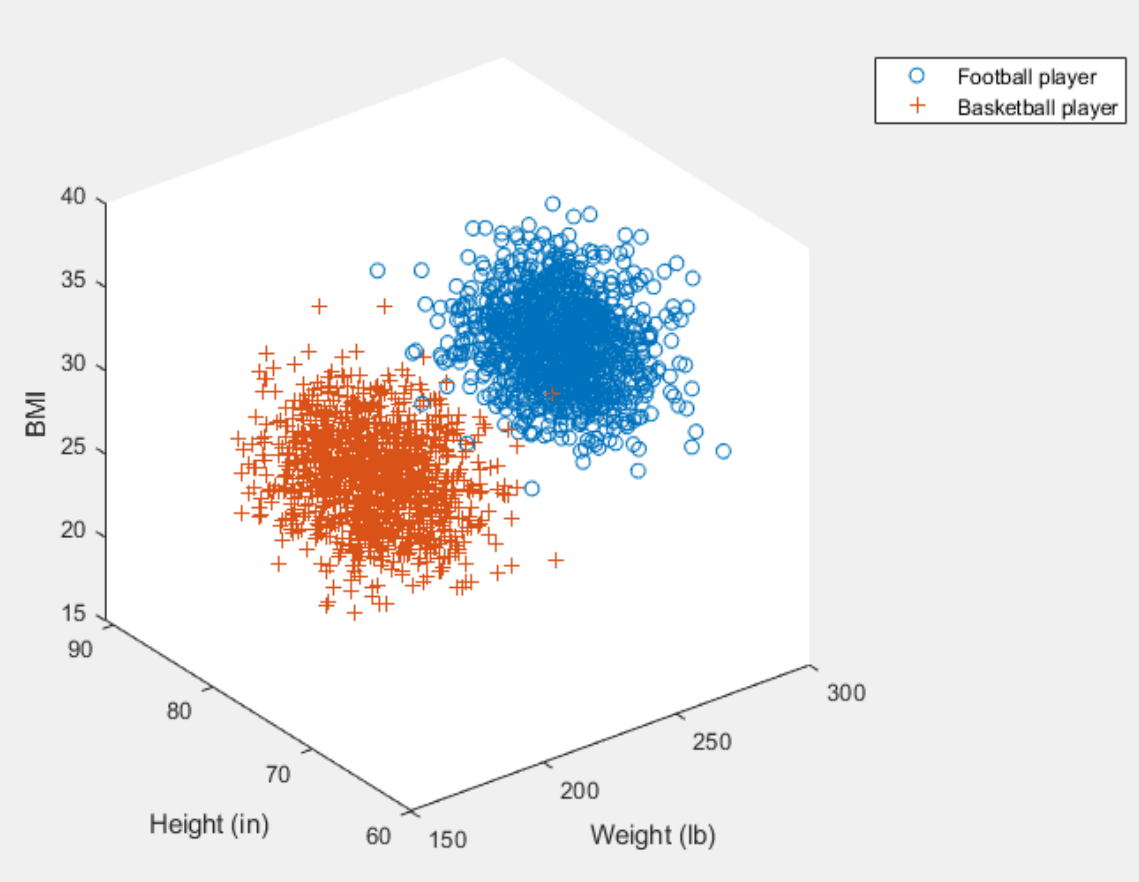
- 2 categories: Basketball players and Football players
- Feature vectors: height, weight and BMI (Ref: Sports Encyclopedia of Pro Football and Official NBA basketball Encyclopedia)
- Normal distribution of points

		Football Player	Basketball Player
Weight (lbs)	Mean (μ)	259.6	205.8
	S.D (σ)	12.1	12.9
Height (in)	Mean (μ)	74.14	79
	S.D (σ)	3.51	3.89



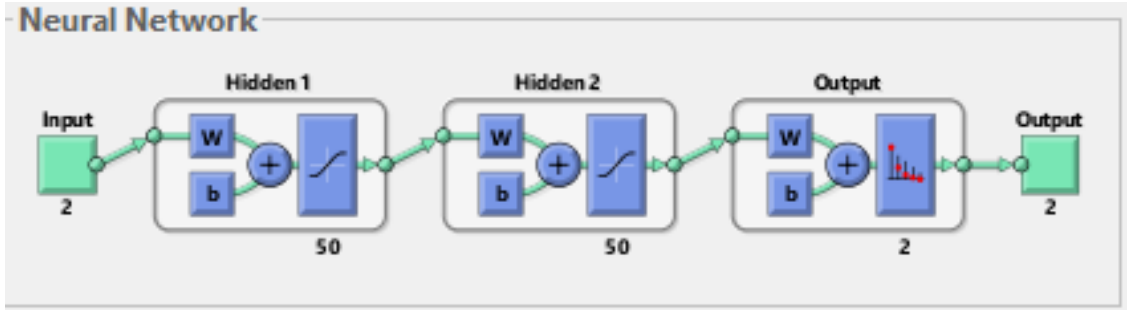
M-dimensional feature vectors (2D vs 3D)



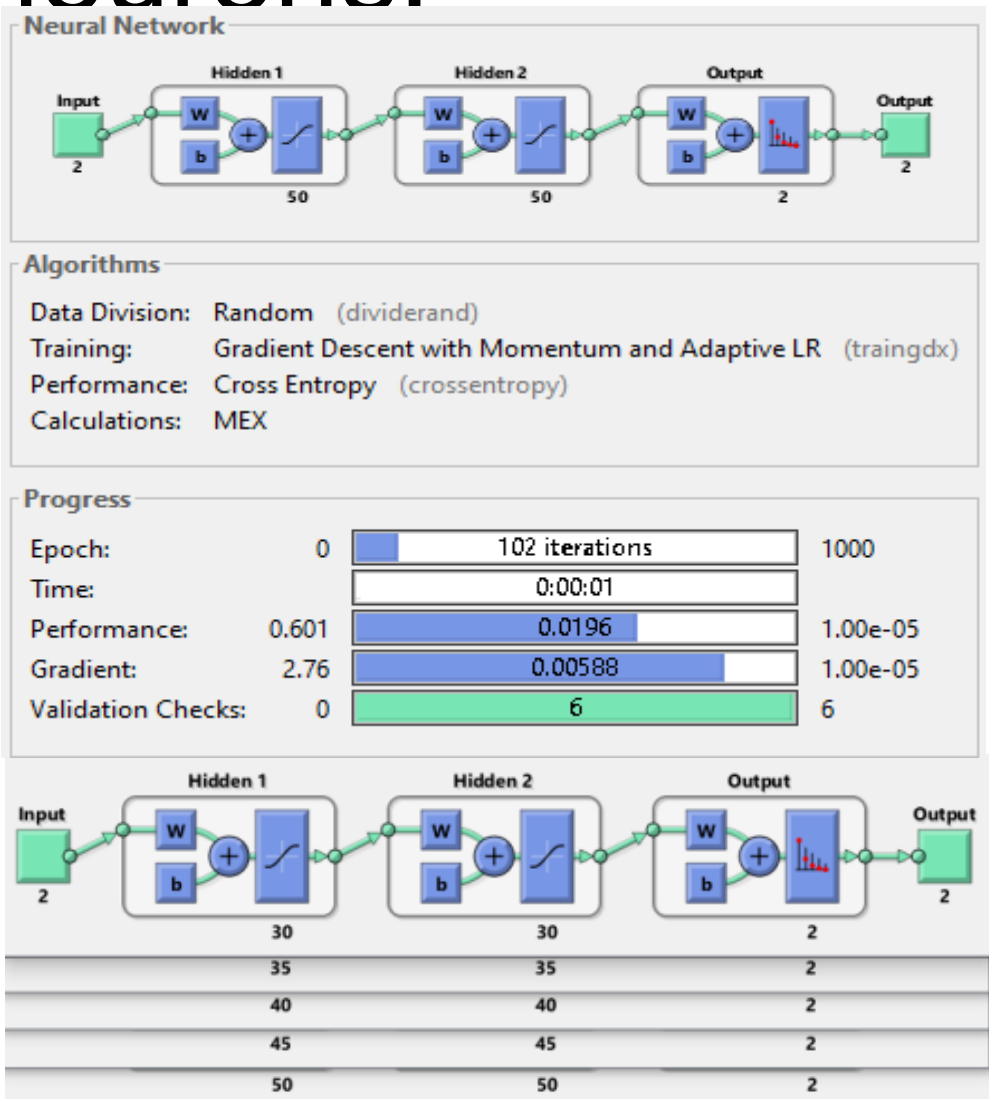


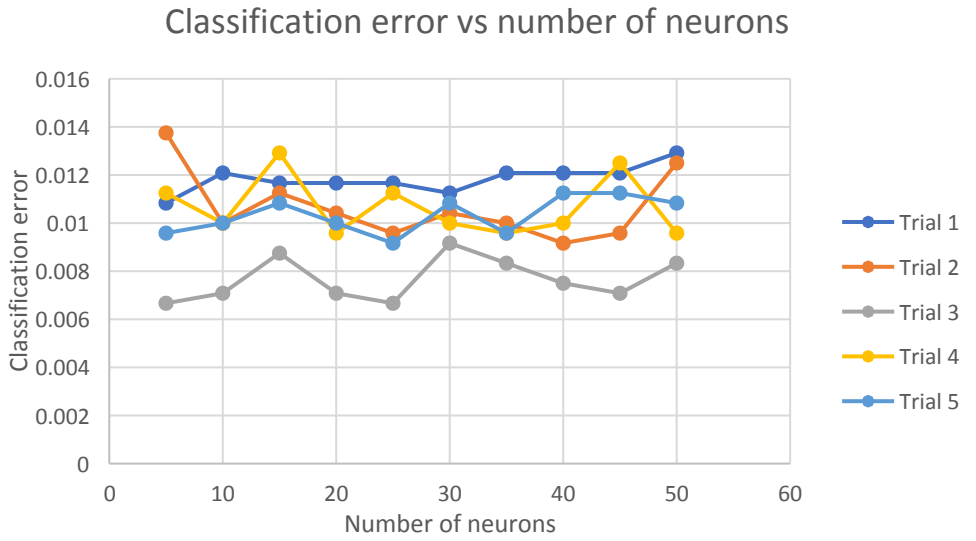
Training the neural network

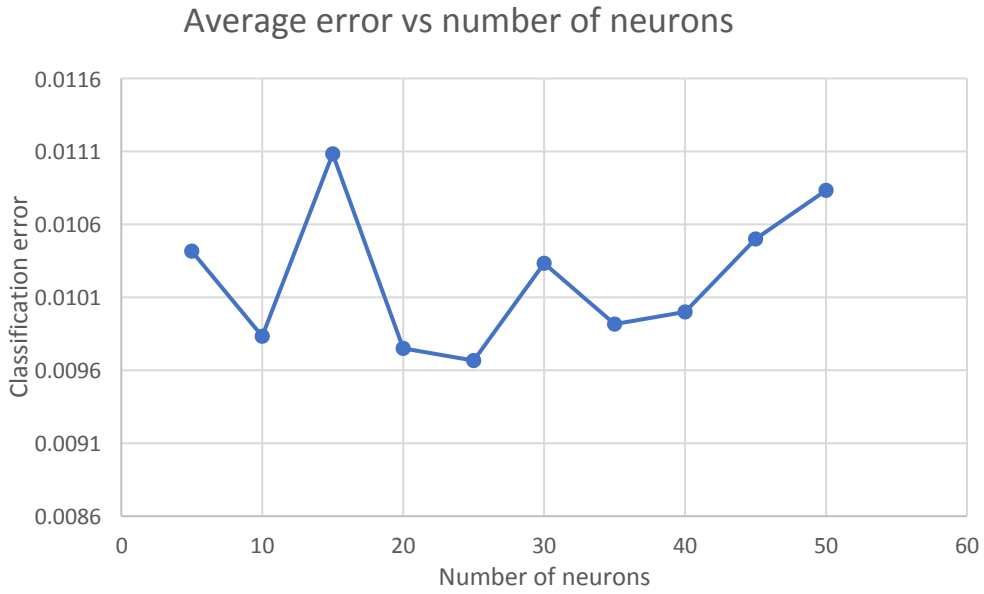
- “Patternet” function in Matlab
- Returns a pattern recognition networks (feedforward network) that can be trained to classify inputs according to target classes.
- Training function: “traingdx”- Variable Learn.Gradient descent
- Performance function: “crossentropy”



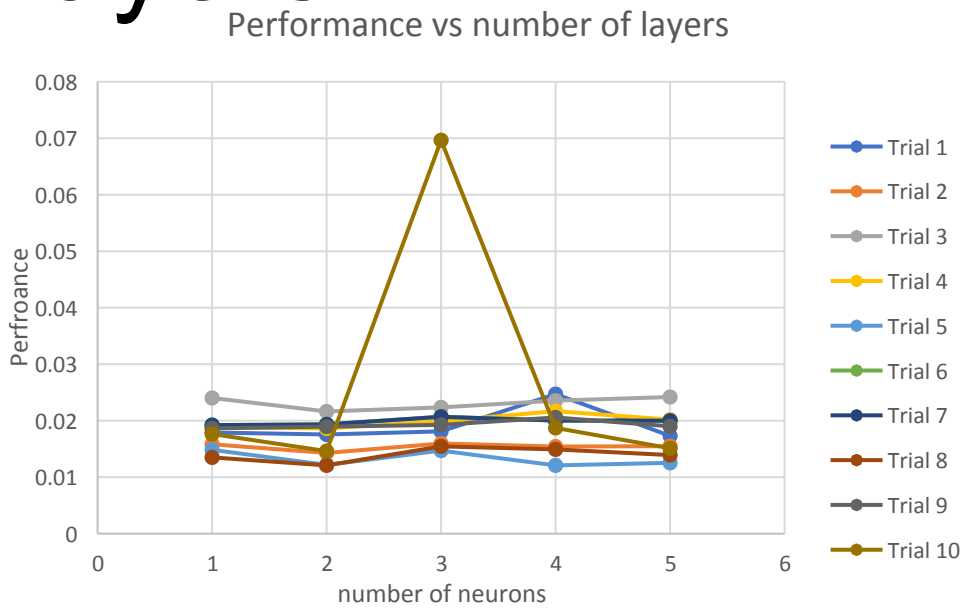
Experimenting with various number of neurons:

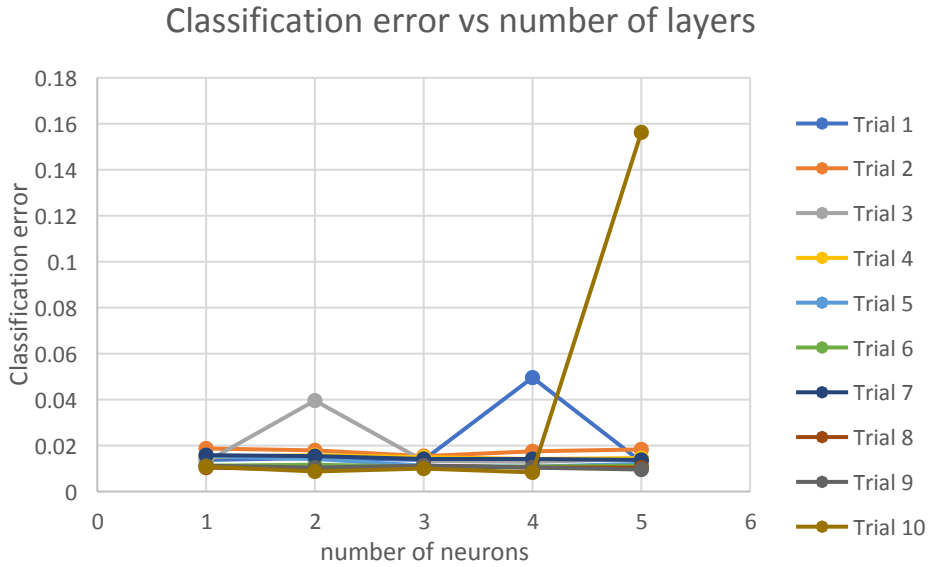


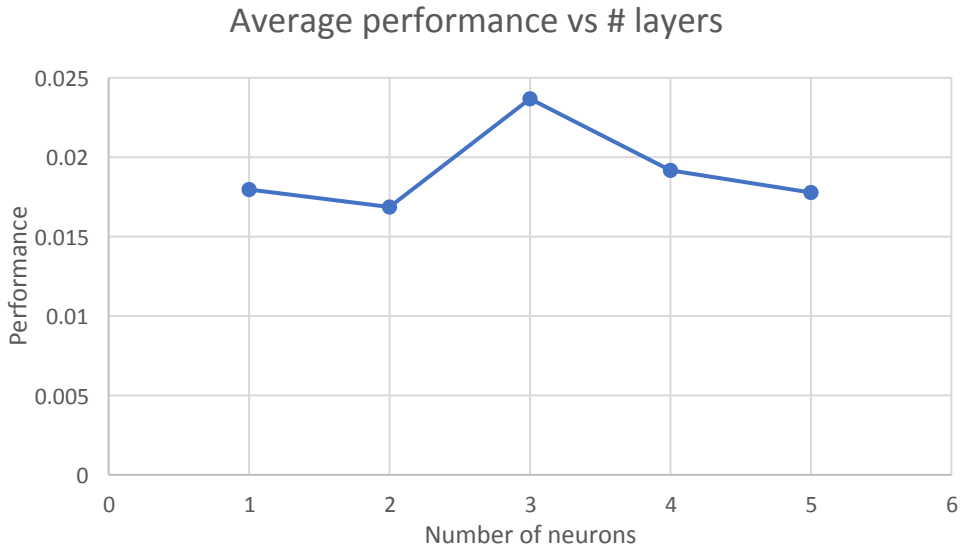


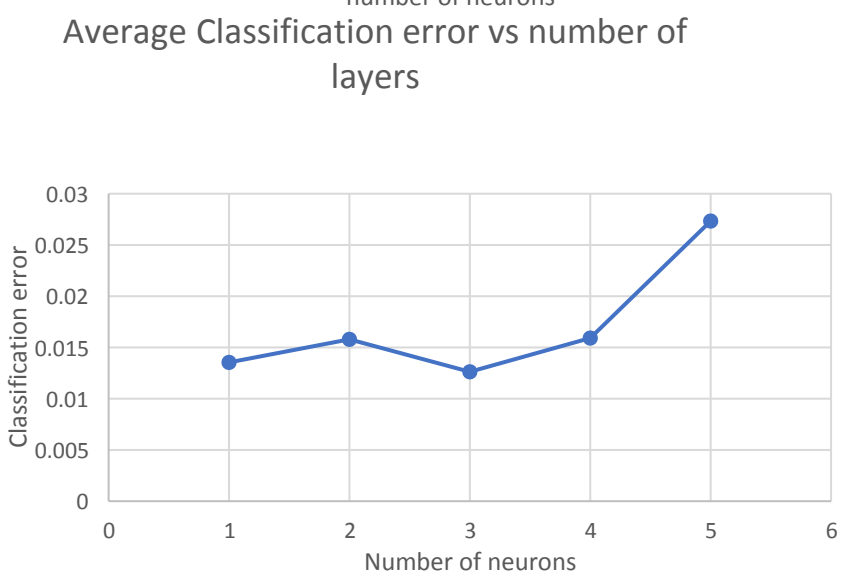


Experimenting with multiple hidden layers

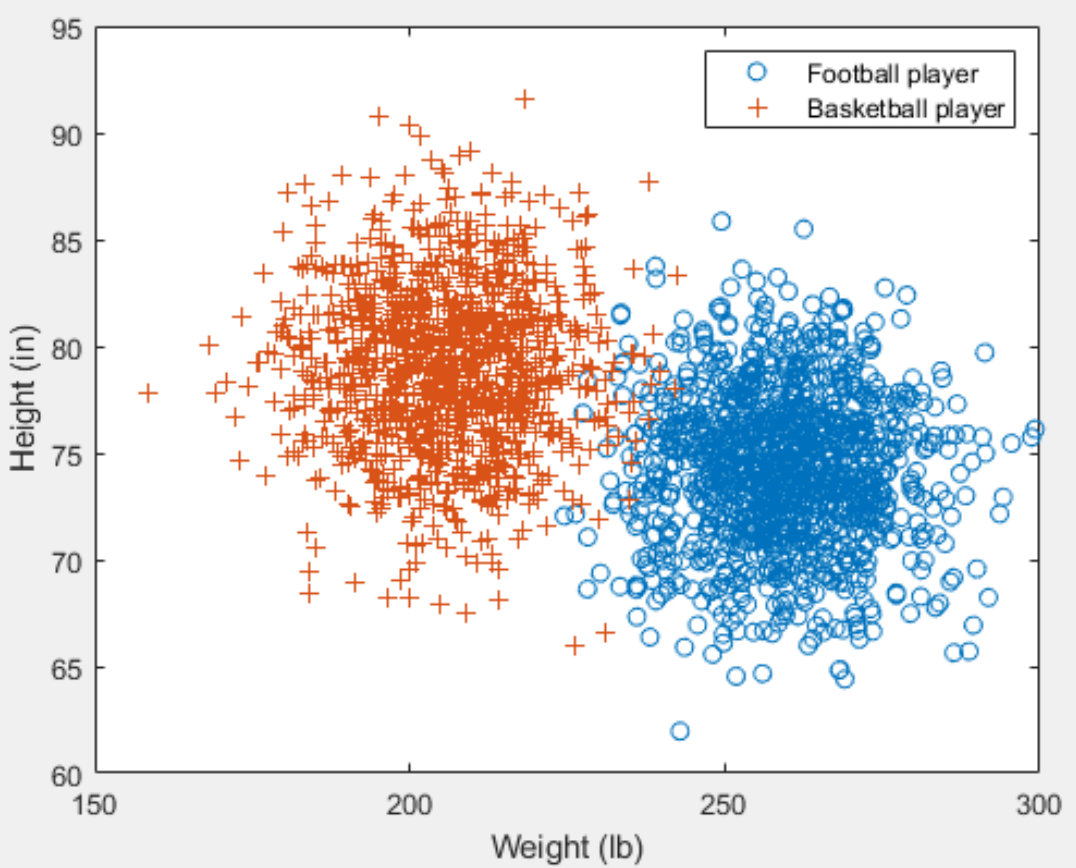


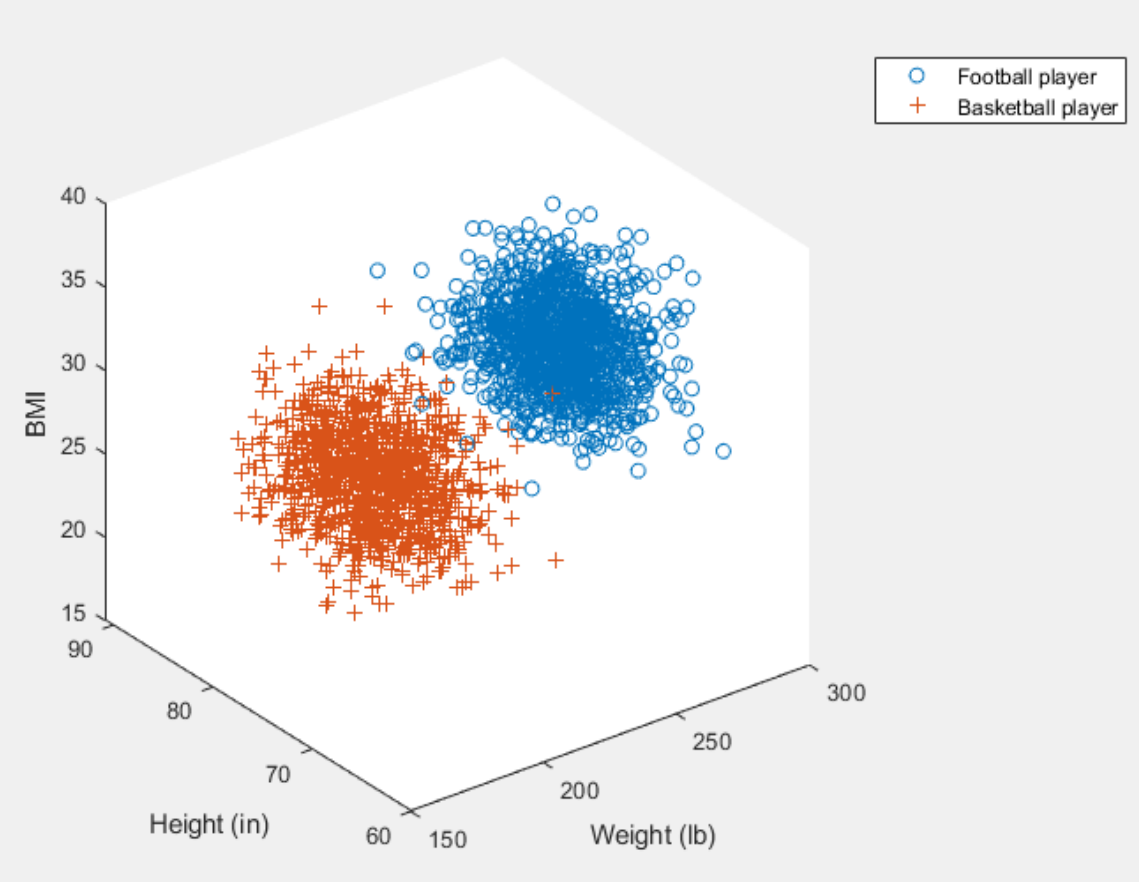




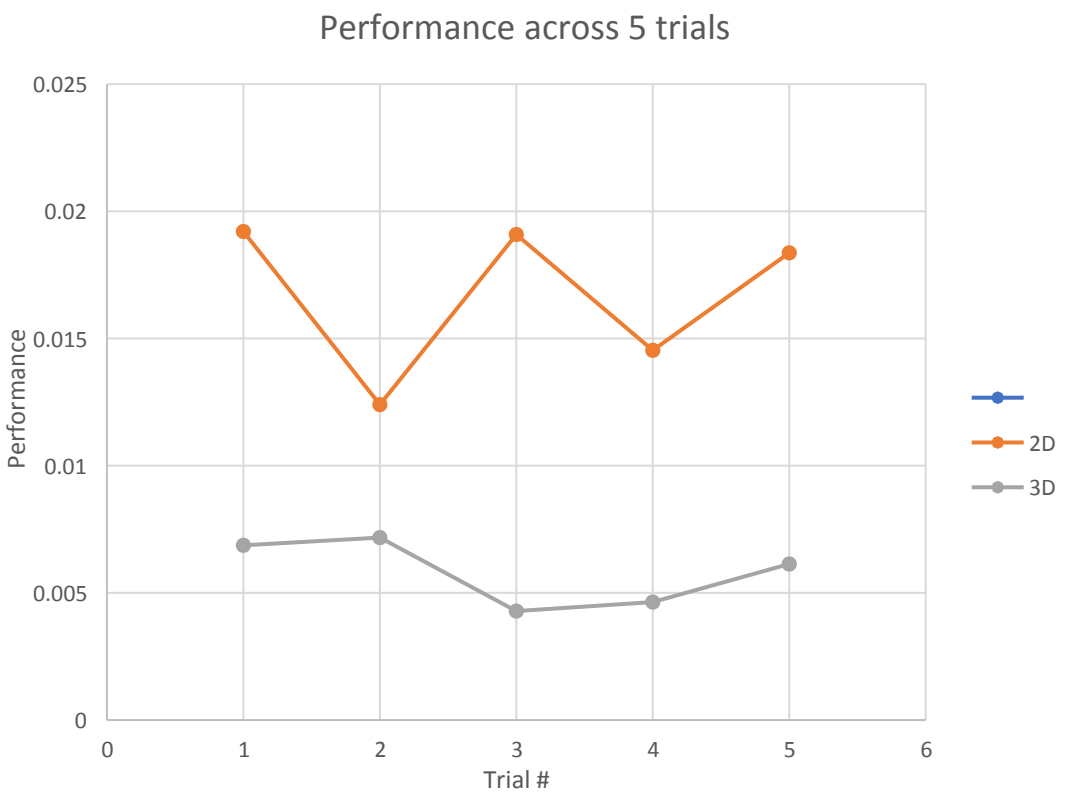


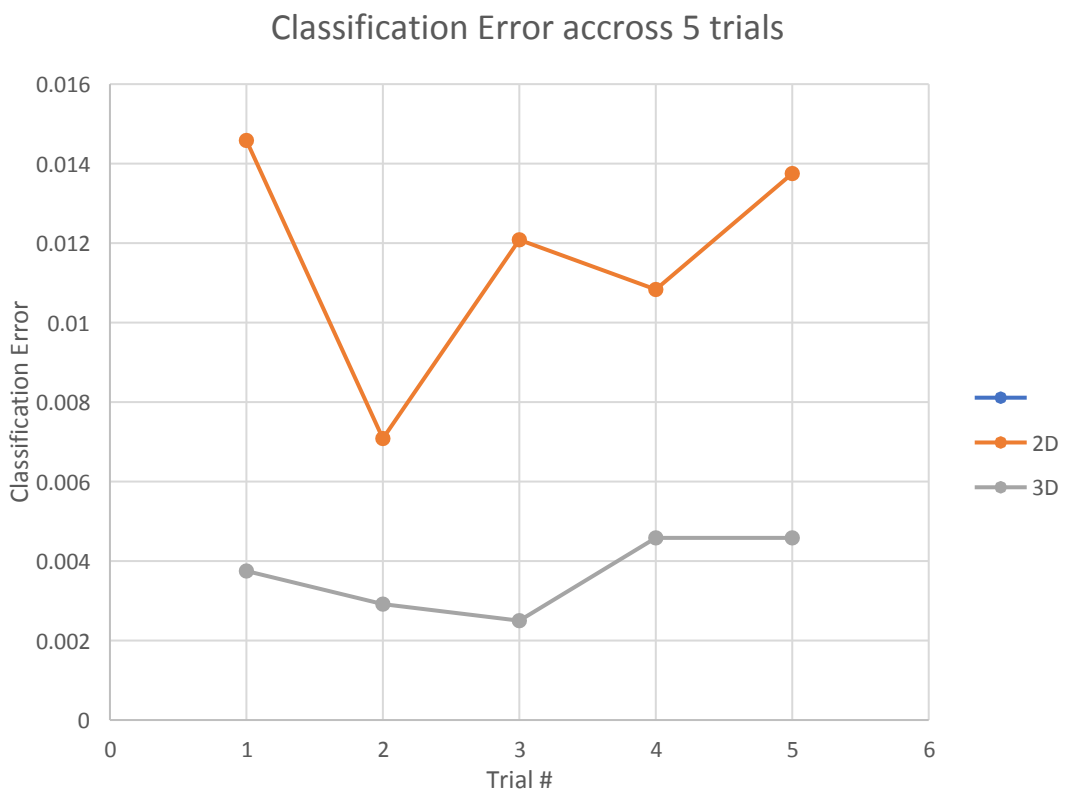
M-dimensional feature vectors (2D vs 3D)





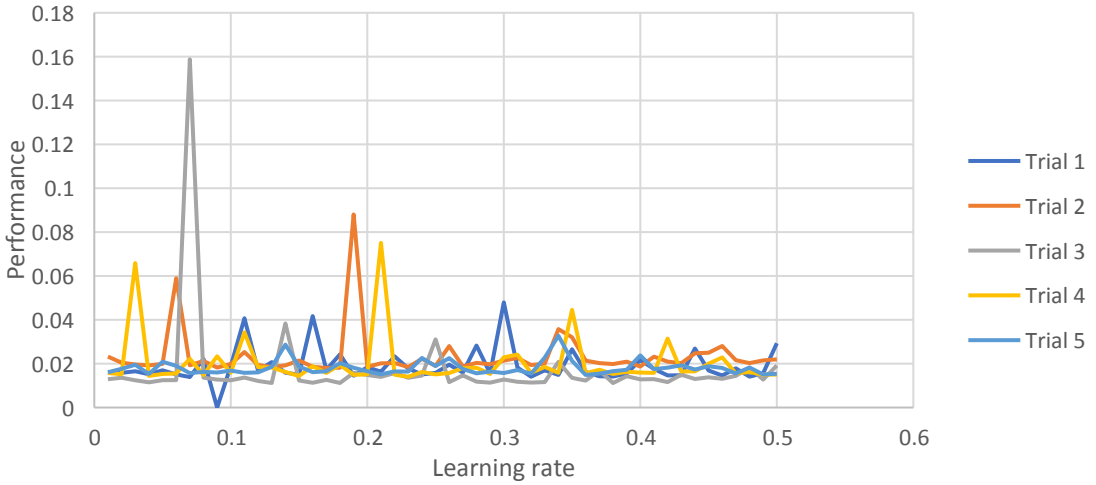
Performance and Accuracy (2 D vs 3D)



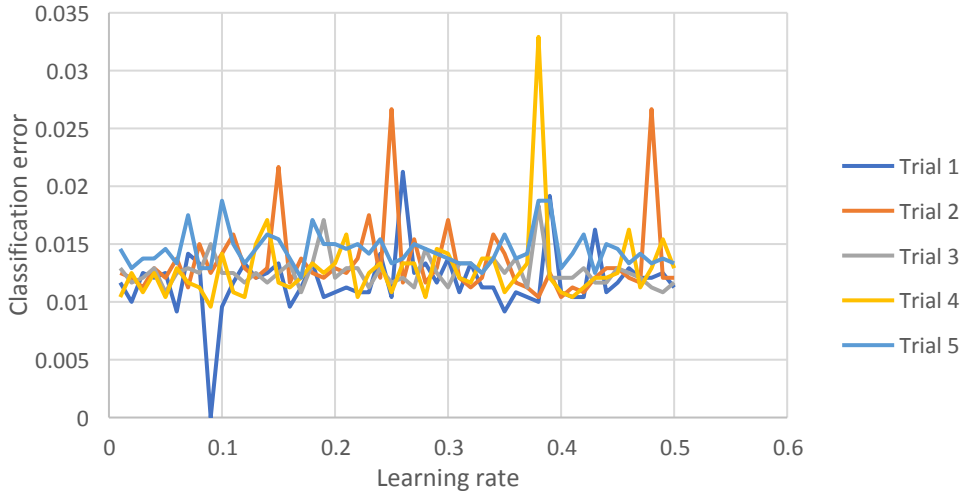


Learning rate

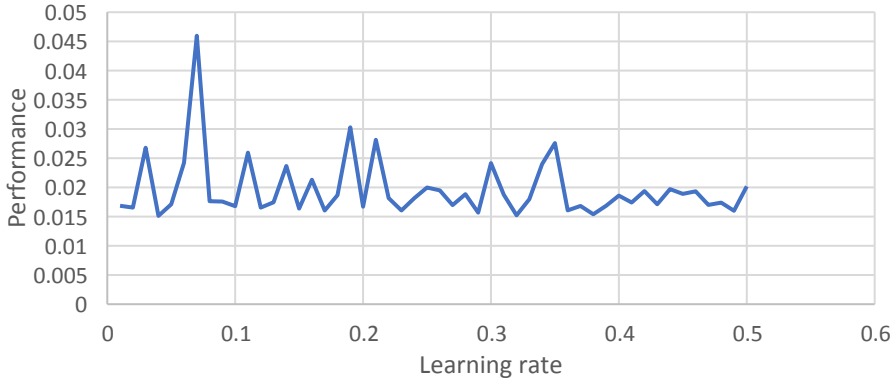
Performance vs Learning rate (0.01 – 0.5)



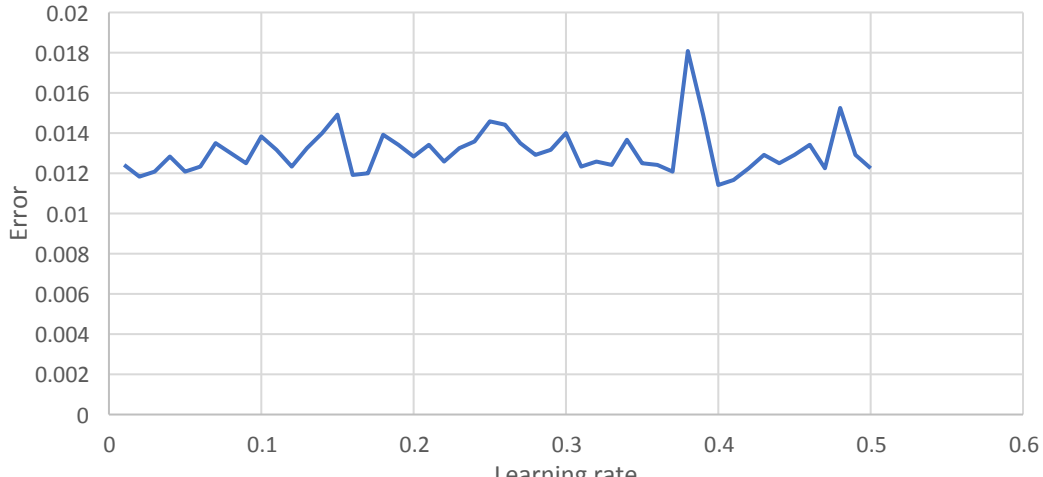
Classification error vs Learning rate (0.01 - 0.5)



Average performance vs Learning rate



Average classificatior error vs learning rate (0.01 - 0.5)



Thank you for your time!