3. Motivation

Exercises due Oct 28, 2020 05:29 IST *Completed*

Review: True or False

2/2 points (graded)

Consider the classification decision rule

$$\hat{y} = \text{sign}\left(\theta \cdot \phi\left(x\right)\right)$$

where $x \in \mathbb{R}^d$ represent input data and $y \in \{1, -1\}$ is the corresponding predicted labels, and we have omitted the bias/offset term for simplicity.

Given the model above, determine if the following statements are True or False.

1. The feature map ϕ is function from $\mathbb{R}^d$ to $\mathbb{R}^d$.

   false ✔ **Answer:** false

2. If $\phi\left(x\right) \in \mathbb{R}^D$, then the classification parameter θ is also a vector in $\mathbb{R}^D$. (Answer based on the model as written.)

   true ✔ **Answer:** true

Solution:

1. The output of feature map $\phi\left(x\right)$ is a vector that is **not** necessarily and often not of the same dimension of the input x. For example, consider $x = \left[x_1, x_2\right]^T \in \mathbb{R}^2$, and $\phi\left(x\right)$ a quadratic feature map $\phi\left(x\right) = \begin{bmatrix} x_1 & x_2 & x_1^2 & x_1 x_2 & x_2^2 \end{bmatrix}^T \in \mathbb{R}^5$.

2. The classification parameter θ must of the same dimension of the feature vectors $\phi\left(x\right)$ for the dot product $\theta \cdot \phi\left(x\right)$ to make sense.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

Motivation

Start of transcript. Skip to the end.

Welcome back.

Today we're going to be talking about feed-forward neural

networks.

And these lectures are going to be in two parts--

understanding them as models and then learning them from data.

0:00 / 0:00 1.25x

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Motivation to Neural Networks

So far, the ways we have performed non-linear classification involve either first mapping x explicitly into some feature vectors $\phi(x)$, whose coordinates involve non-linear functions of x, or in order to increase computational efficiency, rewriting the decision rule in terms of a chosen kernel, i.e. the dot product of feature vectors, and then using the training data to learn a transformed classification parameter.

However, in both cases, the feature vectors are **chosen** . They are not learned in order to improve performance of the classification problem at hand.

Neural networks, on the other hand, are models in which the feature representation is learned jointly with the classifier to improve classification performance.

Discussion

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Topic: Unit 3 Neural networks (2.5 weeks):Lecture 8. Introduction to Feedforward Neural Networks / 3. Motivation

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Revision
As already very well pointed by @ijlorant , here is a superb revision material: https://www.youtube.com/watch?v=8S1IjHtJ9VE&list=PL_on... 4
Pinned

Handwritten_lecture_notes
Check out my notes for this lecture : https://drive.google.com/drive/folders/172YN9JMYWjb-6k6Sd3USa4TInUKSROWr?usp=sharing 14

Can onyone explain what teacher means when say that
Hi everyone, I am not English native speaker. 3:24 teacher says - $It's \left[mapπng\frac{b}{w}x \text{ and } \phi \right] \neg tail \text{ or } ed \rightarrow thetasktwearetry \in g$ - 3

Neural Network 3D Simulation (link, just for fun)
This is how some NN architectures from input to output could looks like https://www.youtube.com/watch?v=3JQ3hYko51Y https://www.... 2
Community TA

Needs Clarity in Questions
In Ques1) 1st part. It is looking like Domain to Range. As he was asking for some function. 2

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