PV021 Neural networks

Exam manual

This manual specifies knowledge demanded at the PV021 exam. Please, keep in mind that the knowledge described below is mandatory even for the E grade. Missing a single part automatically means F. You are supposed to know everything from the course. However, in some parts you have to know all details of all formulae, all proofs etc.

Here they are:

- Slides 17 - 54: You need to know all definitions, formally, using the mathematical notation. You need to be able to explain and demonstrate the geometric interpretation of a neuron. Keep in mind that I may demand complete proofs (e.g. slide 43), or at least the basic idea (slide 45). You do not need to memorize the exact numbers from the slide 52 but know the claims about computability.

- Slides 76 - 99. Everything in great detail. You need to be able to provide all mathematical details as well as understanding of the fundamental notions such as maximum likelihood and all proofs.

- Slides 101 - 113. Everything in great detail including all details of all proofs (including the handwritten ones). You also need to be able to explain what the formulae mean.

- slides 115 - 162. All details of all observations and methods except:

  - Slide 126: Just know roughly what the theorem says.
  - Slide 133: Do not have to memorize all the schedules, just understand that there is a scheduling and be able to demonstrate one schedule.
  - Slide 144: You do not need to memorize 1.7159 but have to know why the number is this.
  - Slide 148: You do not have to memorize all the ReLU variants, just know one.
  - Slides 149, 150: No need to memorize, fine to know.

  Let me stress that apart from the above exceptions, you need to have a detailed knowledge, including the mathematical formulae (e.g. for the momentum, AdaGrad etc.), and intuitive understanding.

- Slides 202 - 214: Everything in great detail including all the handwritten stuff. You may be asked to derive the backpropagation algorithm for CNN even though it did not explicitly appear in the lecture (but is similar to the derivation for MLP). It also helps to know the intuition for CNN from the applications (slides 176 - 200).

- Be able to explain the visualization methods (saliency maps, occlusion, LIME, etc.).

- Slides 216 - 231: All details including all the handwritten stuff. You may be asked to derive the backpropagation algorithm for RNN even though it did not explicitly appear in the lecture (but is similar to the derivation for MLP). You have to know how LSTM is defined (formally and intuitively).