Introduction

(Neural Networks Implementation and Application Tutorial)

Vilém Zouhar, Noon Pokaratsiri Goldstein

28th November 2021

Overview

- Introduction
- Requirements
- Materials
- Assignments
- TODO (lecture content)
- Current assignment
- QA

Hello

Who am I?

Who are you?

Introduction

Choose and answer at least two questions:

- On scale from 1-10 how proficient are you in programming and mathematics?
- What topics of Neural Networks excite you the most?
- What topics of Neural Networks excite you the least?
- What programming languages do you know?
- How best can the tutotial sessions be helpful to your needs?

Requirements

Tutorial Requirements (exam admission)

- 60% of mandatory points (~10 assignments, 10 points each)
- Tutorial points only for exam admission (no final grade influence)

Tutorial Bonus Points

- ~2pts for extra exercises in the assignments
- 1pt for answering a question in a tutorial
- ??pt for fixing errors in tutorial presentations
  - github.com/zouharvi/uds-nnia-tutorial

Final Project

- None

Transfer from last year

- Maybe possible (tbd)
- Assignments recommended (because of the exam)

What's available

- Lectures by Prof. Klakow (recorded)
- Tutorials (not recorded, but allowed for private sharing)
- Corrected homework
- Consultations
  - Only in specific cases
  - By default **no** email and **no** personal chat
  - Ask questions during the lecture / tutorials
- Public forum (please use Piazza)
  - Ask questions
  - Other students will also benefit from the answers
  - You can answer someone else's issue

Assignments

- Mandatory groups of 2
- Usually 2 exercises per assignment + a possible bonus question
- Jupyter notebook templates
  - Assignment + solution in the same notebook
  - Can use Google Colab or local runtime
  - Write solutions in Python files and import them
  - Submitted notebook must only contain your analysis and outputs
- Only one submission per group
  - Submit through Teams

Dates / Times

- Lecture: Tuesdays 14:15-15:45
- Tutorials:
  - Vilém: Wednesday 16:00-18:00
  - Noon: Thursday 08:30-10:00
- Assignments
  - Released (usually) by Wednesday 08:00 (available in Teams)
  - Deadline (next) by Wednesday 08:00 (submit in Teams)
- Exam: TBD

Tutorial Content

- Review of the topics covered in class
- Presentation of the past assignment
- Discussing doubts in current assignment

Current Homework

- Assignment 1
- Previous assignment to review:
  - Assignment 0

Linear Algebra Basics

Let's go over the definitions and some examples of these terms:

- Scalars
- Vectors
- Matrices
- Tensors

Linear Algebra Basics

Some operations and properties involving matrices:

- transpose
- inverse
- dot product (i.e. matrix multiplication)

Linear Algebra Basics

Review: matrix multiplication or dot production

$$C = AB$$

$$C_{i,j} = \sum_k A_{i,k} B_{k,j}$$

Linear Algebra Basics

Common Properties:

- $A(B + C) = AB + AC$
- $A(BC) = (AB)C$
- $AB \neq BA$
- $(AB)^T = B^T A^T$

Linear Algebra Basics

True or False?

- Every real matrix has an eigenvalue decomposition.
- Every real matrix has a singular value decomposition.
- Any real symmetric matrix has an eigenvalue decomposition.

TODO: examples/definitions for the following

Definitions:

- eigenvector
- eigenvalue
- eigendecomposition
- singular value decomposition (SVD)

Numpy Basics

TODO (Examples in Jupyter Notebook?)

Resources

1. Course Website:
   lsv.uni-saarland.de/neural-networks-implementation-and-application-winter-2021-2022-2
2. Piazza: https://piazza.com/class/kvc3vzhsvh55rt
3. Tutorial repository github.com/zouharvi/uds-nnia-tutorial
4. Lecture & tutorial teams channels