AdvPT Project

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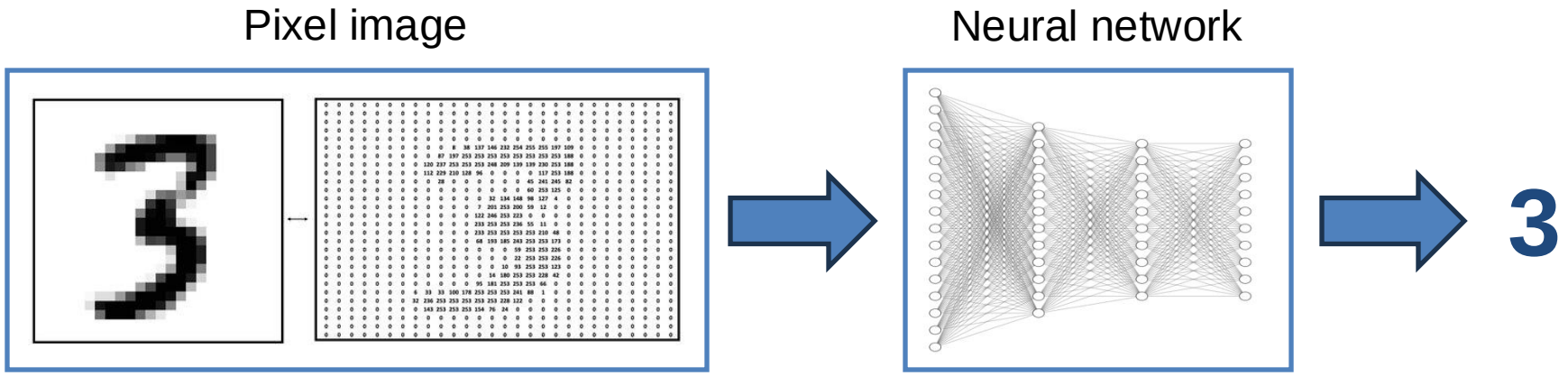
Project Topic



Task at hand: Handwriting detection via NNs

- More concrete: Classification of digits in the MNIST dataset
- Input: 28x28 (=784) greyscale image
- Output: Digital character for the predicted class (here: ‚3‘)

- Good overview and basic understanding about NNs: **videos from 3blue1brown**

Implementation details will be provided next week!

Timeline (I)

- Group registration
  - Form at StudOn: Exercise Material -> Project -> Group Registration
  - Max. group size: 3
  - Automatic testing of your codes via evaluation pipeline on GitLab
  - Group submissions are highly recommended due to
    - Distribution of work, otherwise the project is very time-consuming and challenging
    - Collaborative environment
    - Decreased workload for evaluation systems
    - Higher evaluation frequencies possible
  - **Begin**: 02.12.2024
  - **End:** 12.12.2024
- Environment Setup
  - Automatic creation of accounts and repositories at LSS GitLab

Timeline (II)

- Environment Setup
  - Directly after end of registration phase
  - Automatic creation of accounts and repositories at LSS GitLab
  - You will be provided a repository with
    - A PyTorch reference program for initial understanding of NNs
    - A reference implementation for the tensor class
    - Files containing the MNIST dataset
    - Your „own“ continuous integration (CI) pipeline for testing
    - **Note**: this CI pipeline is separate from the evaluation pipeline

Timeline (III)

Implementation phase starts directly with environment setup

Comprises two parts

- Part 1 (I/O)
  - Reading in pixel images
  - Writing out predicted labels
- Part 2 (fully-connected neural network implementation)

Project deadline: **TBA** (but most likely at the end of the semester)

Future Scope: Timeline (IV)

Remaining time can be used for possible extensions

- Optimization of NN components, e.g.
  - Implement batching
  - Use of more complex optimizers, e.g. ADAM
  - …
- Optimization of core data structure (Tensor)
- CPU Parallelization techniques
  - OpenMP
  - MPI
  - …

Thank you and good luck!

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