

Computer Vision

Task for Project | Autumn, 2021



Instructor



Yuriy Kochura



Department of Computer Engineering



@y_kochura



iuriy.kochura@gmail.com

Info



English



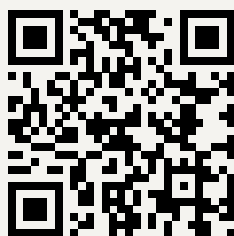
Tuesday 02:15 PM - 3:50 PM



6 prog. assignments + project



Final exam



Course Materials

Description

This course will introduce you to deep learning approaches that are used in cutting-edge research in computer vision and provide practical experience:

- Using of neural networks (fully connected and convolutional layers, forward and backward propagation, activation functions, ...)
- Training of neural networks (initialization, optimization, regularization, model choice, ...)

Prerequisites

- Basic familiarity with Python 3.
- An understanding of fundamental concepts in linear algebra and probability.

Grading

30% Programming assignments (5% each)
40% Project
30% Final exam

Note! The requisition of admission to semester control (final exam) is

Programming assignments + Project $\geq 42\%$

The [Igor Sikorsky Kyiv Polytechnic Institute](#) rating scale:

A = 95–100	Excellent
B = 85–94	Good
C = 75–84	
D = 65–74	Satisfactory
E = 60–64	
F < 60	Fail
Fx < 42	
Violation of the Honor Code	Removed

Honor Code

You may discuss the programming assignments in groups. However, each student must write down their own solutions independently.

You are obligated to follow the Igor Sikorsky Kyiv Polytechnic Institute [Honor Code](#) and all of the following rules in this course:

1. You must submit solutions, reports or program code that are your own. The usage of solutions or program code that are not your own and presenting them for one's own work is plagiarism and a serious violation of the basic academic standards.
2. You must not share your solution code with other students, nor ask others to share their solutions with you.
3. You must indicate on your submission any assistance you received.

MNIST: Handwritten Digit Recognition

"Education is only a ladder to gather fruit from the tree of knowledge, not the fruit itself."

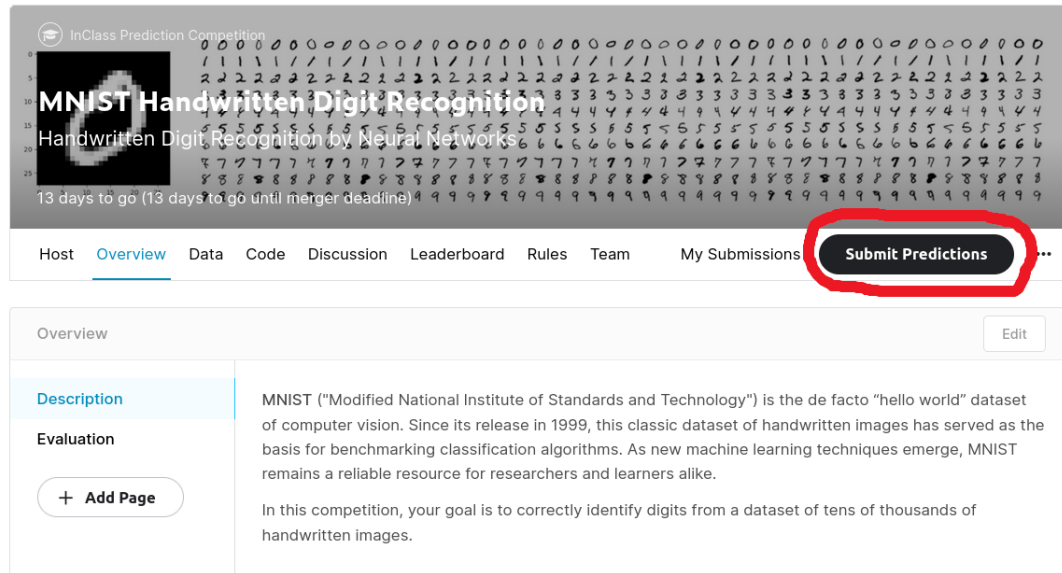
– Albert Einstein

Task description

Explore in details MNIST. MNIST ("Modified National Institute of Standards and Technology") is the de facto "hello world" dataset of computer vision. Your goal is to correctly identify digits from a dataset of tens of thousands of handwritten images. This Project is continuation of your programming assignment 6. I'm looking for your understanding of how deep learning algorithms work for solving this problem. That is why you should describe all steps of training a neural network in details for this problem. The template for which you need to prepare the report you can find in Evaluation section below.

Recognize handwritten digits from [MNIST in CSV](#) dataset by neural networks.

1. You will need an account [kaggle](#) to complete this task (create or use an existing one).
2. Follow the link, read and accept the terms of the competition:
<https://www.kaggle.com/t/ce4ad30d278d480a96d8c8efec791b63>
3. Your task is to train the model so that it recognizes handwritten digits from the test dataset of the competition as well as possible. (`test.csv`).
4. The prediction of your model should be submitted on a competition site: a tab "Submit Predictions".



5. Some examples of how to do this can be found [\[here\]](#), [\[here\]](#) or [\[here\]](#).

Evaluation

The project is worth a total of 40 points.

Your grade for the project will depend on:

- 10% – the script with your model (should be commented in details): `First name Last name_Group.ipynb`
- 90% – a report. You should provide a detailed description of the data set you used, describe the process of setting up the model and preparing data for training, obtained results and conclusions. A rather formal report written in \LaTeX is expected. If you do not want to install additional software, you can use the www.overleaf.com to prepare a report. The template for which you need to prepare the report you can find at [HERE](#)

The structure of this template:

```
...
├── code      # Directory for code files (code listing in the report)
│   ├── test.py
│   └── hello.c
├── images    # The main directory for images (.pdf, .jpg, .png)
│   └── NN_.pdf
├── logo      # Directory with KPI's logo
│   └── LogoKPI.jpg
├── main.pdf   # Produced file after compiling main.tex
├── main.tex   #  $\text{\TeX}$  the report file for editing
├── ref.bib    # Bibliography (BibTeX)
└── report.cls # Report style settings file
```

Submission

Archive `Name Surname_Group.zip`, please, sent for review at <https://cloud.comsys.kpi.ua/s/sP6afeMGwas6yf6>

This archive should include:

- the script with your model commented in details: `First name Last name_Group.ipynb`
- the folder `LaTeX_ProjectReport_EN 2021_ver3.1` in which your report should be located (.pdf file) and other \LaTeX files

Deadline: due at 11:59 PM, December 30

Note! There is no additional deadline for this task.