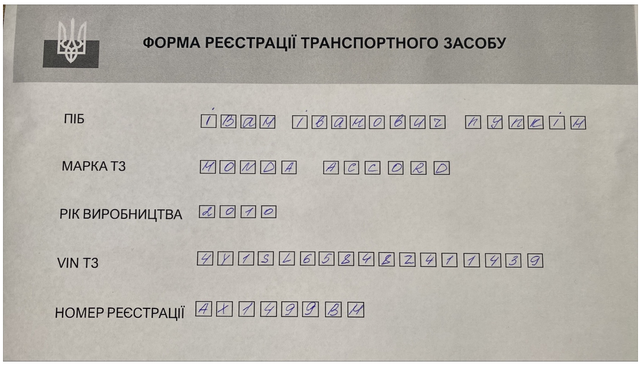
CHI ML Internship 2023

Read full document carefully before start coding. The test task is designed to look like real business task. Good accuracy and correct output format are the best options but we also pay attention to the deadlines, way of thinking, documenting, deploying and code quality. You have **72h** to solve the task but we can accepted your result after deadline. Early deploy will be additionally rewarded. It is good if you can solve the problem with no help but if you need one there are three automatic hints for you. Try to build the best solution as possible by using all generally available tools and datasets. It is recommended to use powerful computer or Google Colab. Pay attention: the document is confidential! Good Luck!

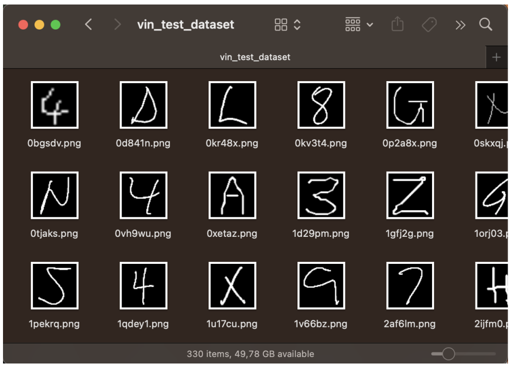
The Problem:



ФОРМА РЕЄСТРАЦІЇ ТРАНСПОРТНОГО ЗАСОБУ

ПІБ	Іван Іванович Пупкін
МАРКА ТЗ	HONDA ACCORD
РІК ВИРОБНИЦТВА	2010
VIN ТЗ	4Y1SL65848Z411439
НОМЕР РЕЄСТРАЦІЇ	AX1499BM

Example of a form from police vehicle database



Example of input png files for neural net

The police department of Kharkiv needs to digitalize an old vehicle database. Every card from the database has special field with 17 boxes that is filled by handwritten VIN-code characters - one character in each box. **VIN** or **vehicle identification number** is a unique code, including a serial number, used by the automotive industry to identify individual vehicles. The cards are already scanned and the VIN-code boxes are already recognized. The task is to design a neural network that can classify small squared black&white image (VIN character boxes) with single handwritten character on it. The software must be done on Python and result must be delivered as ZIP archive (100Mb max) with following files:

- model - binary file in most optimal format that stores model

- training script - python file that prepare, train and save model.
- test inference script - python file that takes one CLI argument that is path to directory with image samples and print output to console in CSV format. Program must find all images in directory in common formats like PNG or JPG (JPEG). Exact input image size can be different. The output format is a single text line for every image in input directory “[character ASCII index in decimal format], [POSIX path to image sample]”. The number of output lines must be equal to images in input folder.
- documentation in .md format that describes the used data, methods and ideas, also reports accuracy. Don’t forget to add the usage instruction and author information.
- Dockerfile or requarements.txt that prepares the environment. Docker is preferable.

Example of program output with Docker environment

```
ls /mnt/test_data
letter_A.png   letter_F.jpeg   number_5.jpeg   e4bh4wb35.jpeg

docker run -it --rm ... ls /app
model.h5   inference.py   train.py   readme.md   requirements.txt

docker run -it --rm ... python3 /app/inference.py --input /mnt/test_data
065, /app/test_data/letter_A.png
070, /app/test_data/letter_F.jpeg
053, /app/test_data/number_5.jpeg
053, /app/test_data/e4bh4wb37.jpeg
```

Example of program output with requirements.txt

```
ls /mnt/test_data
letter_A.png   letter_F.jpeg   number_5.jpeg   e4bh4wb35.jpeg

ls /app
model.h5   inference.py   train.py   readme.md   requirements.txt

python3 -m venv /app/myenv

source /app/myenv/bin/activate

pip3 install -r requirements.txt

python3 /app/inference.py --input /mnt/test_data
```

```
065, /app/test_data/letter_A.png
070, /app/test_data/letter_F.jpeg
053, /app/test_data/number_5.jpeg
053, /app/test_data/e4bh4wb37.jpeg
```