

## Challenge - Computer Vision Intern

Congratulations for making it to the Challenge stage of the application process! The goal of this task is to objectively assess your technical prowess and your ability to solve problems using machine learning. Please note that the topic, data, and problem set are reflective of the cases we solved in the past.

**Topic:** Classifying the visibility of ID cards in photos.

**Resources:** You can use any resources to complete this task.



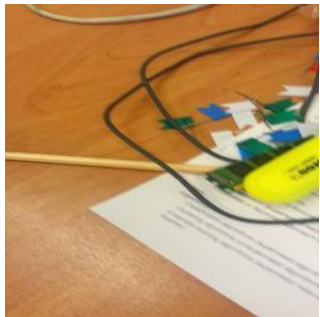
**Deliverable:** Jupyter notebook or a folder containing all your code and documentation.

It should explain the steps you've taken

**The Task:** EXPLORATION, ANALYSIS, MODELLING & OPERATIONALIZATION

The folder **images** inside **data** contains several different types of ID documents<sup>1</sup> taken in different conditions and backgrounds. The goal is to use the images stored in this folder and to design an algorithm that identifies the visibility of the card in the photo (FULL\_VISIBILITY, PARTIAL\_VISIBILITY, NO\_VISIBILITY).

To understand what each visibility type means, consider the following examples<sup>2</sup>:

FULL_VISIBILITY	PARTIAL_VISIBILITY	NO_VISIBILITY
		

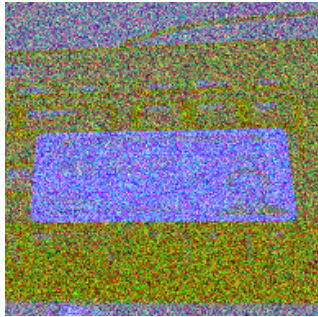
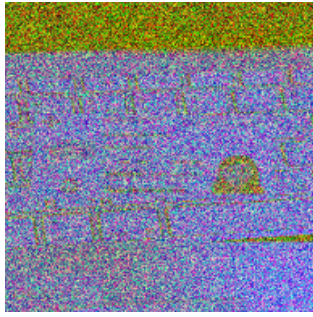
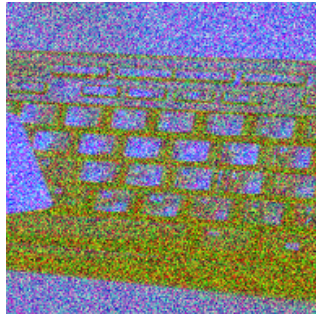
FULL\_VISIBILITY means the card is completely shown; PARTIAL\_VISIBILITY means part of the card is clipped; while NO\_VISIBILITY means the card does not appear in the image at all. We have provided you with the ground truth labels corresponding to each image data in folder **data**, file **gicsd\_labels.csv**. The name of each file is

<sup>1</sup> Original dataset from [MIDV-500: A Dataset for Identity Documents Analysis and Recognition on Mobile Devices in Video Stream](#)

<sup>2</sup> Not real examples from the challenge dataset.

**GICSD\_{CARD\_ID}\_{BACKGROUND\_ID}\_{IMAGE\_ID}**, and you can use this information to make decisions about your approach if you so desire.

Unfortunately, the sensor used when taking these photos was damaged and the photos are corrupted, as the images below show:

GICSD_24_5_153	GICSD_37_5_153	GICSD_50_7_213
		

It's up to you to figure out the best way of handling this situation, but to guide you through this challenge you should refer to the following sub-tasks:

- Data Exploration
  - Explore all the available data. What are your preliminary observations?
- Feature Engineering
  - Utilizing some of your findings from part a) create a function that transforms an image (in the format of a numpy array) into **a single-channel image**. Explain the approach used to achieve this.
- Model Selection/Validation
  - Create an ML model which classifies the visibility (FULL\_VISIBILITY, PARTIAL\_VISIBILITY, NO\_VISIBILITY) of the card in the photo. This model must take a **single-channel image** as input. Justify the choices behind the model and assess the quality of your results.
  - Make a *train.py* module which pulls the raw ids **from the CSV** and generates the fitted model artifact (it should be stored under the **artifacts**

sub-directory).

d) Operationalization

- i) Make a *predict.py* module and write a function that accepts the original **RGB (3-channel) images** and goes through the Feature Engineering and Inference pipelines to yield the predicted result.

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**Guidelines:**

1. We expect you to be creative and inquisitive, tell us a story!
2. Questions a, b, and c(i) should use Jupyter notebooks. Assumptions, comments, and reasoning must be added in the notebook.
3. *Questions c(ii) and d(i) should be reproducible using the same entry point. You can use a main.py module as your entry point and accept command-line arguments which specify if you want to train a model or make a prediction.*  
*e.g. python main.py -train*  
*python main.py -predict {path\_to\_image}*
4. Code should be production grade, generic, and reusable (e.g. use functions and classes).
5. You may use any packages to aid your work.
6. Assumptions can be made but should be stated and backed up with data where possible.
7. Communicating your thought process is very important, make an effort to write a good explanation of your approach as the evaluation is going to be made not only on the model's performance but also on the **choices made during the process**.
8. Play to your strengths, let us know through your work what those might be.
9. The complexity of the challenge and the limited timeframe will be taken under consideration when evaluating the task. **We are not expecting you to spend more than the time assigned.**

**Good luck!**