**Study topics and tasks for students**

Requirements for completing [tasks](https://drive.google.com/drive/folders/1DIFyyo9d6fRRfS6WdlaNccz3JvywFy0L?usp=drive_link): computer, webcam, [Google Mail](https://support.google.com/mail/answer/56256?hl=en) account.

There are three learning strategies to choose from:

1. Study each exercise carefully and perform each one.
2. Choose one topic and focus on studying it. In the best case, we’ll start writing a **joint research article** (academic paper) on the chosen topic.
3. Combined option. **Quickly** familiarize yourself with the proposed tasks and concentrate on studying one topic. With the possibility of writing a research article.

Most likely we’ll choose the second strategy (option B) for topics 7 and 8.

The following topics are available for study:

1. Classification of three-dimensional (3D) medical images. File "01\_3D\_image\_classification.ipynb".
2. Implementation and launch of a Generative Adversarial Network (GAN). A simple version of GAN and a more advanced one. Files "02.1\_Simple\_GAN\_example.ipynb" and "02.2\_DCGAN\_example.ipynb".
3. Image processing with Python without neural networks. File "03\_Image\_processing\_with\_Python.ipynb".
4. OpenCV features detectors and descriptor extractors algorithms with GUI. File "04\_OpenCV\_feature\_detectors\_and\_descriptor\_extractors.ipynb".
5. Implementation and experiments with ReAct (reasoning and acting) AI (artificial intelligence) Agent. File "05\_AI\_Agent.ipynb".
6. Generating heat maps using neural network class activation maps. File "06\_Heatmap\_using\_CAM.ipynb".
7. **Independent work on assignment.** Self-supervised contrastive learning code example. Directory "additional\_data/Contrastive\_Learning\_research".
8. **Independent work on assignment.** Maps segmentation using the pipeline in file "additional\_data/UNet\_image\_segmentation\_v2.ipynb". Maps generation using the pipeline in file "additional\_data/Pix2Pix\_GAN\_implementation.ipynb".

*After your internship*, you can continue your studies with the following course: "Practical Deep Learning for Coders" (<https://course.fast.ai/>).