

## Computation tutorial

In this document we provide steps you can take to run your model in an environment with computational resources for free. Use this if your models take too long to run on your local machines. While we try to provide these steps to make it easier for you to set up your running environment, some errors might come up which this tutorial does not cover, in that case talk to your TA about it and see from there.

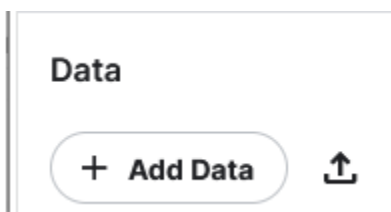
### Kaggle

We mostly recommend using Kaggle (<https://www.kaggle.com>) as it is quite user friendly and free. You can also check out the official documentation (<https://www.kaggle.com/docs/notebooks>) if this tutorial does not work or you need something more specific.

Kaggle already provides most of the common python packages. However, if you get an error message saying a package was not found, you can run one code cell with the necessary pip instalments. To run commands through the code blocks, you need to put an exclamation mark in front of them (e.g. `!pip install tqdm`). Additionally, Kaggle also contains its own console in the bottom left corner of the notebook. Through there you can run any specific commands provided by the supervisor if needed.

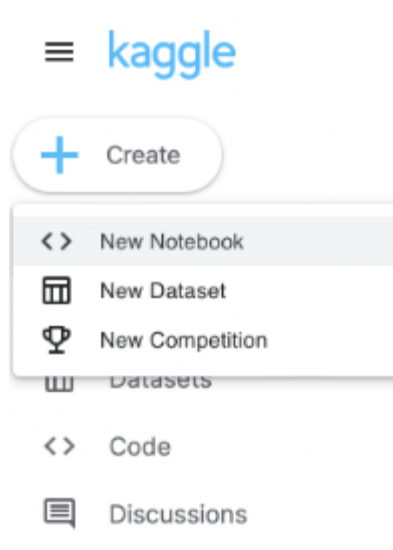


Lastly, to get a custom package into your repository you can either manually add the files into your input, using the "Add Data" button on the right, or use the command line to copy files from some repository into your Kaggle notebook with git commands (e.g, `git clone ssh://your-repo.git`)

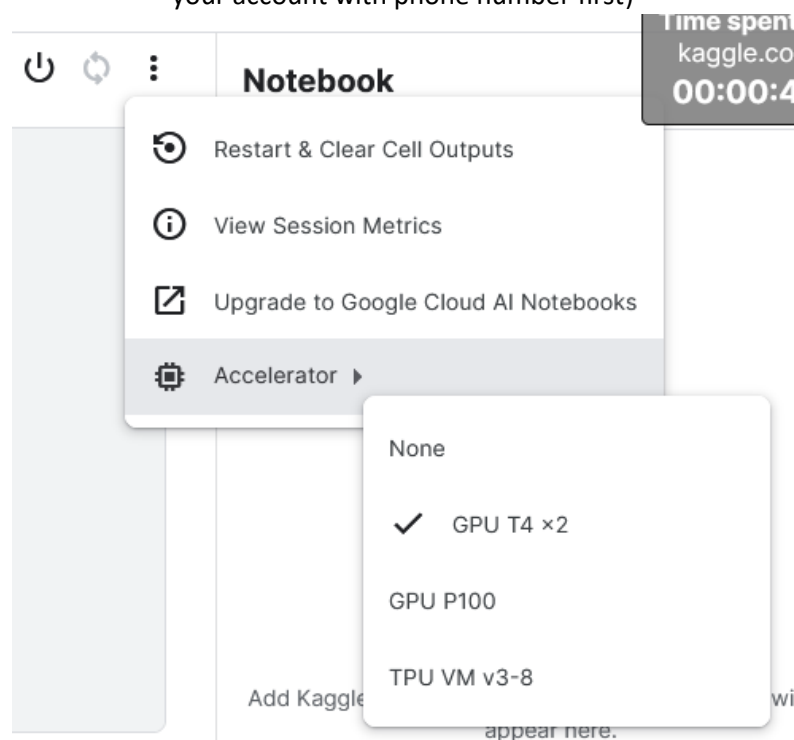


Steps to set up a Kaggle notebook with GPUs:

1. Create a Kaggle account or log in if you already have one.
2. Create a notebook: click 'Create' from the left column -> click 'New Notebook'

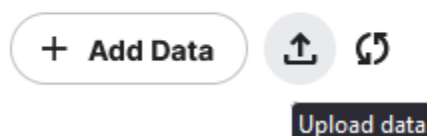


3. If an accelerator GPU is needed, you can find it from 'Settings' right column. (You need to verify your account with phone number first)



4. You can upload your own datasets or use the datasets by clicking '+ Add data' from the right column. You can also import existing datasets on Kaggle, if you need to.

## Data



5. All your working files (like models and outputs) that your code generates, should be automatically stored in “/kaggle/working/...”
6. Run your python code using “Save & Run All (Commit)”

Now some other information about Kaggle:


- a) After you run your code you can close the browser, it will continue running.
- b) All notebooks should finish running after 12 hours. If this is not enough time, you can also save the latest model, and continue running from there again. (**!!But make sure you save checkpoints of your model!!**)
- c) Every week you have 40 hours of free computation, so try to run Kaggle only once you’re sure there are no mistakes. So fix them in your local IDE, and then copy the code into Kaggle.

## Google Cloud

If Kaggle is not enough and you need more computation power, then you can use the Google Cloud platform. However, we recommend you first try the above-mentioned Kaggle, as setting up and working with Google Cloud tends to be quite difficult and takes up a lot of valuable time. Follow these steps to set-up a VM environment on Google Cloud.

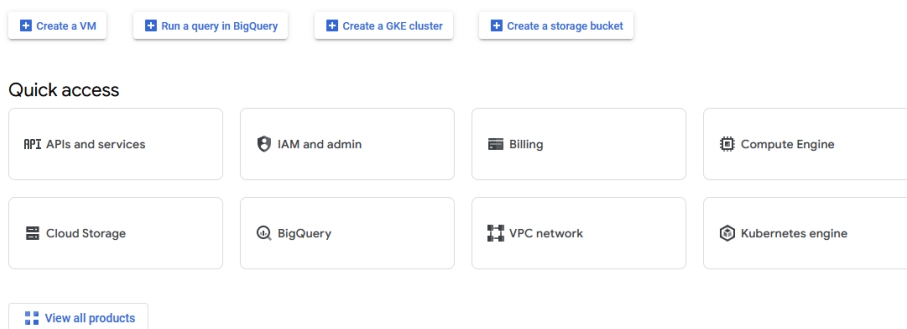
1. Go to <https://console.cloud.google.com> and create a Project

Select a project

 NEW PROJECT

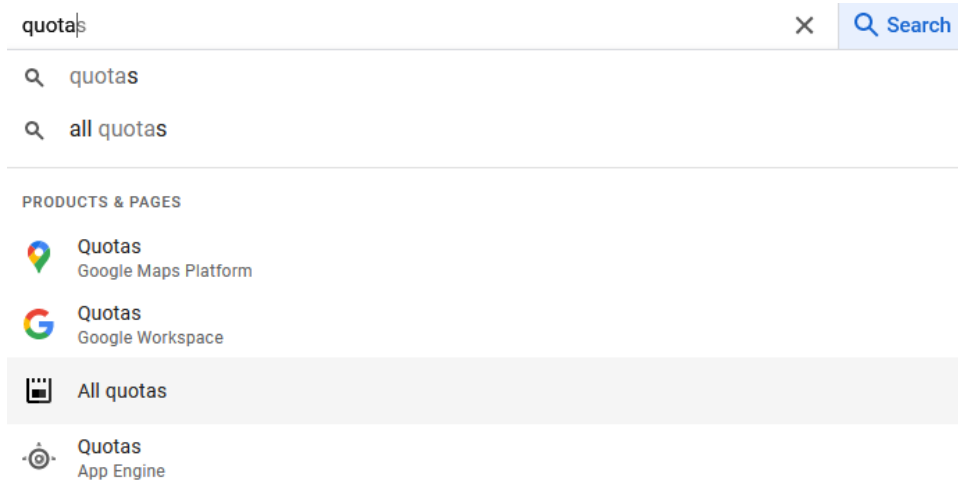
Search projects and folders

2. Once you have created a project, start from the dashboard provided by Google Cloud. It should look something like this:



3. Click on the “Compute Engine” service under Quick Access

4. Using the search bar on the top, search for “All Quotas”







































5. In the filter option, filter by Quota -> [insert the GPU you want to use]. For the GPU selection it really depends on your project and GPU availability. From our observation the T4 GPUs are the most reliable, but they are also used quite often, so it might take a long time to find a window where you can run your project. After you filter the list, you should see something like this:

Filter

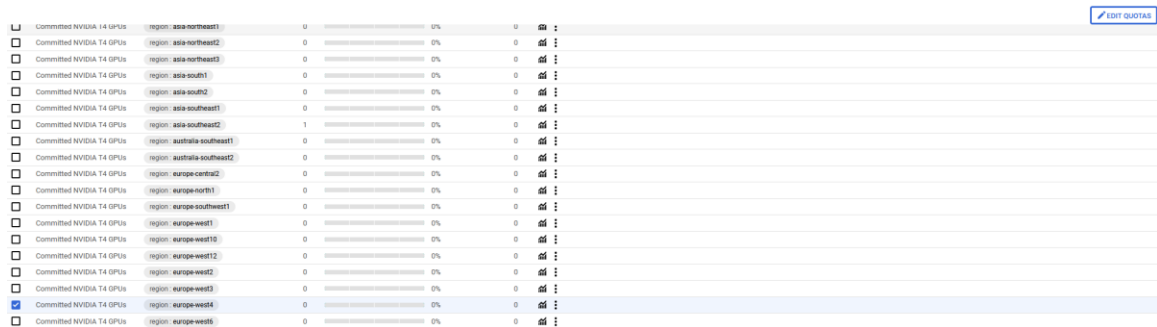
Sort : Committed NVIDIA T4 GPUs

Enter property name or value

<input type="checkbox"/>	Quota	Dimensions (e.g. location)	Limit	Current usage percentage ↓	Current usage
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-east1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-east2	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-northeast1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-northeast2	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-northeast3	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-south1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-south2	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-southeast1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : asia-southeast2	1	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : australia-southeast1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : australia-southeast2	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-central2	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-north1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-southwest1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-west1	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-west10	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-west12	0	<div><div></div></div> 0%	0  
<input type="checkbox"/>	Committed NVIDIA T4 GPUs	region : europe-west2	0	<div><div></div></div> 0%	0  

You should see 0s as the limit for everything. (The 1 you see in the image is from our internal testing.)

- Select one location where you want to run your project. Europe-west4 is in the Netherlands but tends to be quite busy. After selecting one, click “Edit Quotas”



Quota	Region	Used	Limit	Percentage	Unit
Committed NVIDIA 1.4 GPUs	region: asia-northeast1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: asia-northeast2	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: asia-northeast3	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: asia-south1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: asia-south2	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: asia-southeast1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: asia-southeast2	1	0	0%	1.4
Committed NVIDIA T4 GPUs	region: australia-southeast1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: australia-southeast2	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-central2	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-north1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-southwest1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-west1	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-west2	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-west3	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-west4	0	0	0%	1.4
Committed NVIDIA T4 GPUs	region: europe-west6	0	0	0%	1.4

- Fill out the form to request GPU quota increase. Make sure to describe your project well and request enough GPUs so you do not have to request more later. From our experience you should get a positive response within minutes of sending the request.
- After you have increased your quota, you can create your virtual environment. Go back to the “Compute Engine” and click “Create a VM instance”
- When creating the VM instance there are many options to choose from. We will only cover some of the more crucial ones, but feel free to also discuss this with your supervisor or your TA whether they think your choices are sensible.
  - Make sure to select the Region where you have requested GPUs. The Zone does not matter usually.
  - Select “Allow HTTP traffic” under Firewall for future communication
  - Change the Image used under Boot disk with the following (this is a recommendation):



Operating system  
Deep Learning on Linux

Version \*  
Debian 10 based Deep Learning VM for PyTorch CPU/GPU with CUDA 11.3 M94

Deep Learning VM Image with PyTorch 1.11 and fast.ai preinstalled.

- Keep track of the billing. You get 50 USD of student credits for free, so if you pick the best hardware you will burn through them quickly.
  - Same as with Kaggle, make sure your code will run error-free before you use your VM, so you avoid wasting credits.
- After you finish setting up your VM, you will be able to access it through Google Console. To add files and run them, you need to import them into this VM. The easiest way is to create a git repository and clone your files directly on your VM through Google console.