Cloud Deployment, Optimization Strategies for Teaching, Training and Collaborative Reproducible Research (static python code into a dynamic web-based environment, no local installations)

Reference:
- https://www.dataschool.io/cloud-services-for-jupyter-notebook
- https://mybinder.readthedocs.io/en/latest/faq.html
- https://www.dxc.technology/insurance/offerings/11097/140442-bindercloud
- https://openreview.net/forum?id=BJlR6KTE3X

1. Binder basic info
    1. Discussion about comparison of open source cloud technologies (Binder, Colab etc.)
        1. The core tech is called Docker. After transforming GitHub code repository into docker image, one can user web browser to communicate server
        2. Docker is more efficient than Java virtual machines and requires less resources.
    2. Software compatibility with GitHub: How easy is it to integrate the technology with Github or other sources?
        ● Very easy, only need a GitHub repository URL and configuration files.
    3. How effective is it to use these cloud deployments for running a workshop/teaching?
        ● It works the same way as Jupiter Notebook, so it is easy to use; but it can be quite unstable as the launching will not succeed sometimes.

    4. How much traffic can each resource accommodate? What are the limitations?

Too Many User Error:

Error loading ravichas/ML-predict-drugclass/66b90b8e99d63c03548f53951f09421554e330b3!
See logs below for details.

Your session is taking longer than usual to start!
Check the log messages below to see what is happening.

Build logs   hide

Found built image, launching...
Too many users running https://github.com/ravichas/ML-predict-drugclass! Try again soon.

Long Time No Response:

Starting repository: ravichas/ML-predict-
drugclass/66b90b8e99d63c03548f53951f09421554e330b3

Your session is taking longer than usual to start!
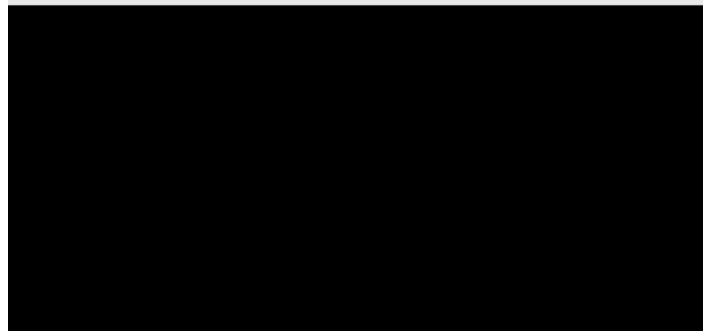Check the log messages below to see what is happening.

Click "logs" and check whether the following words show up. If so, the launching generally finishes within 2 minutes.

Build logs

```
Found built image, launching...
Launching server...
```

If nothing shows up, then the launching has a big possibility to fail. So it would be better to refresh the link instead of waiting.

Build logs

Number of visits sending	Launch Successfully	Still Loading after 10 min	Too Many Users	Fail Connection

				ERROR	ERROR
200	43	125	32	0
150	16	95	39	0
150	52	86	11	1
140	50	89	0	1
140	0	87	53	0
135	54	78	3	0
130	53	77	0	0
125	28	97	0	0
100	41	59	0	0

- The test file here is ML_drugs_class
- According to the table, the range of true traffic tolerance is between 130-135 people with simultaneous visits.
- A large number of visits still keep loading after 10 minutes. They are the visits that are able to communicate with mybinder server but have difficulty creating the environment.
- Binder is not very stable, as some of the visits will end up with connection failure.
- Binder does not perform well here. But what also contributes to this result is that only one browser is used to send many web requests at the same time. In real life, people visit the url from different computers and the pressure of the browser will not be much.

5. launching time
   The average time collected is from recordings in F12-network-waterfall with 50 observations each.

	ML_drug_class	ML_TC1
Avergae_Time	2000ms-3000ms	2500ms-3000ms