

**МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ  
РОССИЙСКОЙ**

**ФЕДЕРАЦИИ**

**Федеральное государственное автономное**

**образовательное учреждение высшего образования**

**«СЕВЕРО-КАВКАЗСКИЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»**

**Кафедра инфокоммуникаций**

**«Модули и пакеты»**

**Отчет по лабораторной работе № 2.13**

**по дисциплине «Основы программной инженерии»**

Выполнил студент группы ПИЖ-б-о-21-1

Гребенкин Е. А. « » 2022г.

Подпись студента \_\_\_\_\_

Работа защищена «  
» \_\_\_\_\_ 20\_\_ г.

Проверил Воронкин Р.А. \_\_\_\_\_

(подпись)

**Цель работы:** приобретение навыков по работе с менеджером пакетов `pip` и виртуальными окружениями с помощью языка программирования Python версии 3.x.

**Выполнение работы:**

1. Изучить теоретический материал работы.
2. Создать общедоступный репозиторий на GitHub, в котором будет использована лицензия MIT и язык программирования Python.
3. Выполните клонирование созданного репозитория.
4. Организуйте свой репозиторий в соответствии с моделью ветвления `git-flow`.
5. Создайте виртуальное окружение Anaconda с именем репозитория.
6. Установите в виртуальное окружение следующие пакеты: `pip`, `NumPy`, `Pandas`, `SciPy`.
7. Попробуйте установить менеджером пакетов `conda` пакет `TensorFlow`. Возникает ли при этом ошибка? Попробуйте выявить и укажите причину этой ошибки.
8. Попробуйте установить пакет `TensorFlow` с помощью менеджера пакетов `pip`.
9. Сформируйте файлы `requirements.txt` и `environment.yml`. Проанализируйте содержимое этих файлов.
10. Зафиксируйте сделанные изменения в репозитории.
11. Добавьте отчет по лабораторной работе в формате PDF в папку `doc` репозитория. Зафиксируйте изменения.
12. Выполните слияние ветки для разработки с веткой `master/main`.
13. Отправьте сделанные изменения на сервер GitHub.
14. Отправьте адрес репозитория GitHub на электронный адрес преподавателя.

## Создание виртуального окружения с помощью *conda*:

```
conda create -n OPI_17 python=3.9 (1)
```

```
(base) PS C:\Users\diejester\desktop\учеба\опи\opi_17> conda create -n OPI_17 python=3.9
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 22.9.0
  latest version: 23.1.0
Please update conda by running

    $ conda update -n base -c defaults conda

## Package Plan ##

environment location: C:\ProgramData\Anaconda3\envs\OPI_17

added / updated specs:
- python=3.9

The following packages will be downloaded:

package | build | size
-----|-----|-----
ca-certificates-2023.01.10 | haa95532_0 | 121 KB
certifi-2022.12.7 | py39haa95532_0 | 149 KB
openssl-1.1.1t | h2bbff1b_0 | 5.5 MB
pip-22.3.1 | py39haa95532_0 | 2.7 MB
python-3.9.16 | h6244533_1 | 19.4 MB
setuptools-65.6.3 | py39haa95532_0 | 1.1 MB
sqlite-3.40.1 | h2bbff1b_0 | 889 KB
tzdata-2022g | h04d1e81_0 | 114 KB
wheel-0.38.4 | py39haa95532_0 | 83 KB
-----|-----|-----
Total: | | 30.1 MB

The following NEW packages will be INSTALLED:

ca-certificates pkgs/main/win-64::ca-certificates-2023.01.10-haa95532_0 None
certifi pkgs/main/win-64::certifi-2022.12.7-py39haa95532_0 None
openssl pkgs/main/win-64::openssl-1.1.1t-h2bbff1b_0 None
pip pkgs/main/win-64::pip-22.3.1-py39haa95532_0 None
python pkgs/main/win-64::python-3.9.16-h6244533_1 None
setuptools pkgs/main/win-64::setuptools-65.6.3-py39haa95532_0 None
sqlite pkgs/main/win-64::sqlite-3.40.1-h2bbff1b_0 None
tzdata pkgs/main/noarch::tzdata-2022g-h04d1e81_0 None
vc pkgs/main/win-64::vc-14.2-h21ff451_1 None
vs2015_runtime pkgs/main/win-64::vs2015_runtime-14.27.29016-h5e58377_2 None
wheel pkgs/main/win-64::wheel-0.38.4-py39haa95532_0 None
wincertstore pkgs/main/win-64::wincertstore-0.2-py39haa95532_2 None
```

Рисунок 1 – Результат выполнения команды (1) для создания окружения

```
Proceed ([y]/n)? y

Downloading and Extracting Packages
openssl-1.1.1t | 5.5 MB | ##### | 100%
python-3.9.16 | 19.4 MB | ##### | 100%
tzdata-2022g | 114 KB | ##### | 100%
ca-certificates-2023 | 121 KB | ##### | 100%
certifi-2022.12.7 | 149 KB | ##### | 100%
pip-22.3.1 | 2.7 MB | ##### | 100%
setuptools-65.6.3 | 1.1 MB | ##### | 100%
wheel-0.38.4 | 83 KB | ##### | 100%
sqlite-3.40.1 | 889 KB | ##### | 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
#     $ conda activate OPI_17
#
# To deactivate an active environment, use
#
#     $ conda deactivate
#
Retrieving notices: ...working... done
(base) PS C:\Users\diejester\desktop\учеба\опи\opi_17> _
```

Рисунок 2 – Результат выполнения команды (1)

## Активация виртуального окружения:

**Conda activate OPI\_17 (2)**

```
(base) PS C:\Users\diejester\desktop\учёба\опи\opi_17> conda activate OPI_17
(OPI_17) PS C:\Users\diejester\desktop\учёба\опи\opi_17> _
```

Рисунок 3 – Активация виртуального окружения (2)

## Установка пакетов через пакетный менеджер conda:

**Conda install pip, NumPy, Pandas, SciPy (3)**

```
(OPI_17) PS C:\Users\diejester\desktop\учёба\опи\opi_17> conda install pip, NumPy, Pandas, SciPy
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 22.9.0
  latest version: 23.1.0

Please update conda by running

    $ conda update -n base -c defaults conda

## Package Plan ##

  environment location: C:\ProgramData\Anaconda3\envs\OPI_17

  added / updated specs:
    - numpy
    - pandas
    - pip
    - scipy

The following packages will be downloaded:

  package | build | size
  -----|-----|-----
  cffi-1.15.1 | py39h2bbff1b_3 | 238 KB
  cryptography-39.0.1 | py39h21b164f_0 | 1.0 MB
  idna-3.4 | py39haa95532_0 | 93 KB
  numexpr-2.8.4 | py39h5b0cc5e_0 | 127 KB
  numpy-1.23.5 | py39h3b20f71_0 | 11 KB
  numpy-base-1.23.5 | py39h4da318b_0 | 6.0 MB
  packaging-22.0 | py39haa95532_0 | 67 KB
  pandas-1.5.2 | py39hf11a4ad_0 | 10.5 MB
  pooch-1.4.0 | pyhd3eb1b0_0 | 41 KB
  pyopenssl-23.0.0 | py39haa95532_0 | 97 KB
  pytz-2022.7 | py39haa95532_0 | 210 KB
  scipy-1.10.0 | py39h321e85e_1 | 18.7 MB
  urllib3-1.26.14 | py39haa95532_0 | 193 KB
  -----|-----|-----
  Total: | | 37.3 MB

The following NEW packages will be INSTALLED:

  appdirs pkgs/main/noarch::appdirs-1.4.4-pyhd3eb1b0_0 None
  blas pkgs/main/win-64::blas-1.0-mkl None
  bottleneck pkgs/main/win-64::bottleneck-1.3.5-py39h080aedc_0 None
  brotli pkgs/main/win-64::brotli-0.7.0-py39h2bbff1b_1003 None
  cffi pkgs/main/win-64::cffi-1.15.1-py39h2bbff1b_3 None
  charset-normalizer pkgs/main/noarch::charset-normalizer-2.0.4-pyhd3eb1b0_0 None
```

Рисунок 4 – Установка пакетов (3)

```

cffi          pkgs/main/win-64::cffi-1.15.1-py39h2bbff1b_3 None
charset-normalizer pkgs/main/noarch::charset-normalizer-2.0.4-pyhd3eb1b0_0 None
cryptography     pkgs/main/win-64::cryptography-39.0.1-py39h2bbff1b_0 None
icc_rt           pkgs/main/win-64::icc_rt-2022.1.0-h6049295_2 None
idna             pkgs/main/win-64::idna-3.4-py39haa95532_0 None
intel-openmp    pkgs/main/win-64::intel-openmp-2021.4.0-haa95532_3556 None
mkl             pkgs/main/win-64::mkl-2021.4.0-haa95532_640 None
mkl-service     pkgs/main/win-64::mkl-service-2.4.0-py39h2bbff1b_0 None
mkl_fft        pkgs/main/win-64::mkl_fft-1.3.1-py39h277e83a_0 None
mkl_random     pkgs/main/win-64::mkl_random-1.2.2-py39hf11a4ad_0 None
numexpr        pkgs/main/win-64::numexpr-2.8.4-py39h5b0cc5e_0 None
numpy          pkgs/main/win-64::numpy-1.23.5-py39h3b20f71_0 None
numpy-base    pkgs/main/win-64::numpy-base-1.23.5-py39h4da318b_0 None
packaging      pkgs/main/win-64::packaging-22.0-py39haa95532_0 None
pandas         pkgs/main/win-64::pandas-1.5.2-py39hf11a4ad_0 None
pooch          pkgs/main/noarch::pooch-1.4.0-pyhd3eb1b0_0 None
pycparser      pkgs/main/noarch::pycparser-2.21-pyhd3eb1b0_0 None
pyopenssl      pkgs/main/win-64::pyopenssl-23.0.0-py39haa95532_0 None
pysocks        pkgs/main/win-64::pysocks-1.7.1-py39haa95532_0 None
python-dateutil pkgs/main/noarch::python-dateutil-2.8.2-pyhd3eb1b0_0 None
pytz           pkgs/main/win-64::pytz-2022.7-py39haa95532_0 None
requests       pkgs/main/win-64::requests-2.28.1-py39haa95532_0 None
scipy          pkgs/main/win-64::scipy-1.10.0-py39h321e85e_1 None
six            pkgs/main/noarch::six-1.16.0-pyhd3eb1b0_1 None
urllib3        pkgs/main/win-64::urllib3-1.26.14-py39haa95532_0 None
win_inet_pton  pkgs/main/win-64::win_inet_pton-1.1.0-py39haa95532_0 None

Proceed ([y]/n)? y

Downloading and Extracting Packages
pytz-2022.7                210 KB | ##### 100%
cffi-1.15.1                238 KB | ##### 100%
pyopenssl-23.0.0          97 KB  | ##### 100%
pooch-1.4.0                41 KB  | ##### 100%
idna-3.4                   93 KB  | ##### 100%
cryptography-39.0.1       1.0 MB | ##### 100%
numpy-1.23.5              11 KB  | ##### 100%
numpy-base-1.23.5        6.0 MB | ##### 100%
packaging-22.0            67 KB  | ##### 100%
scipy-1.10.0              18.7 MB| ##### 100%
pandas-1.5.2              10.5 MB| ##### 100%
numexpr-2.8.4             127 KB | ##### 100%
urllib3-1.26.14           193 KB | ##### 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Retrieving notices: ...working... done
(OPI_17) PS C:\Users\diejester\desktop\yч6a\onm\opi_17>

```

Рисунок 5 – Установка пакетов (3)

## Установка пакета *TensorFlow*:

### conda install TensorFlow (4)

```

(OPI_17) PS C:\Users\diejester\desktop\yч6a\onm\opi_17> conda install TensorFlow
Collecting package metadata (current_repodata.json): done
Solving environment: failed with initial frozen solve. Retrying with flexible solve.
Solving environment: failed with repodata from current_repodata.json, will retry with next repodata source.
Collecting package metadata (repodata.json): done
Solving environment: done

--> WARNING: A newer version of conda exists. <--
  current version: 22.9.0
  latest version: 23.1.0

Please update conda by running

    $ conda update -n base -c defaults conda

## Package Plan ##

  environment location: C:\ProgramData\Anaconda3\envs\OPI_17

  added / updated specs:
    - tensorflow

The following packages will be downloaded:

package                                     build                                3 KB
tf-select-2.3.0                             mkl                                171 KB
absl-py-1.3.0                               py39haa95532_0                     415 KB
aiosignal-1.2.0                             pyhd3eb1b0_0                       12 KB
astunparse-1.6.3                           py_0                               17 KB
async-timeout-4.0.2                         py39haa95532_0                     84 KB
attrs-22.1.0                               py39haa95532_0                     23 KB
blinker-1.4                                pyhd3eb1b0_0                       13 KB
cachetools-4.2.2                           py39haa95532_0                     32 KB
colorama-0.4.6                             h62663c0_0                         1.4 MB
flit-core-3.6.0                            pyhd3eb1b0_0                      42 KB
frozenlist-1.3.3                           py39h2bbff1b_0                     40 KB
gast-0.4.0                                 pyhd3eb1b0_0                       13 KB
giflib-5.2.1                               h8cc2503_3                         88 KB
google-auth-2.6.0                          pyhd3eb1b0_0                       83 KB
google-auth-oauthlib-0.4.4                 pyhd3eb1b0_0                       18 KB
google-pasta-0.2.0                         pyhd3eb1b0_0                       46 KB
grpcio-1.42.0                              py39hcc605dd_0                     1.9 MB
keras-2.10.0                              py39haa95532_0                     1.5 MB
keras-preprocessing-1.1.2                  pyhd3eb1b0_0                       35 KB
libcurl-7.87.0                             h86230a5_0                         324 KB
libprotobuf-3.20.3                         h23ce68f_0                         2.2 MB

```

Рисунок 6 – Установка пакета TensorFlow (4)

```
Администратор: Anaconda Powershell Prompt (Anaconda3)
Total: 91.9 MB

The following NEW packages will be INSTALLED:

_tflow_select      pkgs/main/win-64::_tflow_select-2.3.0-mkl None
abs1-py            pkgs/main/win-64::abs1-py-1.3.0-py39haa95532_0 None
aiohttp            pkgs/main/win-64::aiohttp-3.8.3-py39h2bbff1b_0 None
aiosignal          pkgs/main/noarch::aiosignal-1.2.0-pyhd3eb1b0_0 None
astunparse         pkgs/main/noarch::astunparse-1.6.3-py_0 None
async-timeout      pkgs/main/win-64::async-timeout-4.0.2-py39haa95532_0 None
attrs              pkgs/main/win-64::attrs-22.1.0-py39haa95532_0 None
blinker            pkgs/main/win-64::blinker-1.4-py39haa95532_0 None
cachetools         pkgs/main/noarch::cachetools-4.2.2-pyhd3eb1b0_0 None
click              pkgs/main/win-64::click-8.0.4-py39haa95532_0 None
colorama           pkgs/main/win-64::colorama-0.4.6-py39haa95532_0 None
flatbuffers        pkgs/main/win-64::flatbuffers-2.0.0-h6c2663c_0 None
flit-core          pkgs/main/noarch::flit-core-3.6.0-pyhd3eb1b0_0 None
frozenlist         pkgs/main/win-64::frozenlist-1.3.3-py39h2bbff1b_0 None
gast               pkgs/main/noarch::gast-0.4.0-pyhd3eb1b0_0 None
giflib             pkgs/main/win-64::giflib-5.2.1-h8cc25b3_3 None
google-auth        pkgs/main/noarch::google-auth-2.6.0-pyhd3eb1b0_0 None
google-auth-oauth~ pkgs/main/noarch::google-auth-oauthlib-0.4.4-pyhd3eb1b0_0 None
google-pasta       pkgs/main/noarch::google-pasta-0.2.0-pyhd3eb1b0_0 None
grpcio             pkgs/main/win-64::grpcio-1.42.0-py39hc60d5dd_0 None
h5py               pkgs/main/win-64::h5py-3.7.0-py39h3de5c98_0 None
hdf5               pkgs/main/win-64::hdf5-1.10.6-h1756f20_1 None
icu                pkgs/main/win-64::icu-58.2-ha925a31_3 None
importlib-metadata pkgs/main/win-64::importlib-metadata-4.11.3-py39haa95532_0 None
jpeg               pkgs/main/win-64::jpeg-9e-h2bbff1b_0 None
keras              pkgs/main/win-64::keras-2.10.0-py39haa95532_0 None
keras-preprocessi~ pkgs/main/noarch::keras-preprocessing-1.1.2-pyhd3eb1b0_0 None
libcurl            pkgs/main/win-64::libcurl-7.87.0-h86230a5_0 None
libpng             pkgs/main/win-64::libpng-1.6.37-h2a8f88b_0 None
libprotobuf        pkgs/main/win-64::libprotobuf-3.20.3-h23ce68f_0 None
libssh2            pkgs/main/win-64::libssh2-1.10.0-hcd4344a_0 None
markdown           pkgs/main/win-64::markdown-3.4.1-py39haa95532_0 None
markupsafe         pkgs/main/win-64::markupsafe-2.1.1-py39h2bbff1b_0 None
multidict           pkgs/main/win-64::multidict-6.0.2-py39h2bbff1b_0 None
oauthlib           pkgs/main/win-64::oauthlib-3.2.1-py39haa95532_0 None
opt_einsum         pkgs/main/noarch::opt_einsum-3.3.0-pyhd3eb1b0_1 None
protobuf           pkgs/main/win-64::protobuf-3.20.3-py39hd77b12b_0 None
pyasn1             pkgs/main/noarch::pyasn1-0.4.8-pyhd3eb1b0_0 None
pyasn1-modules     pkgs/main/noarch::pyasn1-modules-0.2.8-py_0 None
pyjwt              pkgs/main/win-64::pyjwt-2.4.0-py39haa95532_0 None
python-flatbuffers pkgs/main/noarch::python-flatbuffers-2.0-pyhd3eb1b0_0 None
requests-oauthlib  pkgs/main/noarch::requests-oauthlib-1.3.0-py_0 None
rsa                pkgs/main/noarch::rsa-4.7.2-pyhd3eb1b0_1 None
snappy             pkgs/main/win-64::snappy-1.1.9-h6c2663c_0 None
tensorboard        pkgs/main/win-64::tensorboard-2.10.0-py39haa95532_0 None
tensorboard-data-~ pkgs/main/win-64::tensorboard-data-server-0.6.1-py39haa95532_0 None
tensorboard-plugi~ pkgs/main/win-64::tensorboard-plugin-wit-1.8.1-py39haa95532_0 None
tensorflow          pkgs/main/win-64::tensorflow-2.10.0-mkl_py39ha510bab_0 None
tensorflow-base    pkgs/main/win-64::tensorflow-base-2.10.0-mkl_py39h6a7f48e_0 None
tensorflow-estima~ pkgs/main/win-64::tensorflow-estimator-2.10.0-py39haa95532_0 None
```

Рисунок 7 – Установка пакета TensorFlow (4)

```
Администратор: Anaconda Powershell Prompt (Anaconda3)
Proceed ([y]/n)? y

Downloading and Extracting Packages
google-auth-oauthlib 18 KB | ##### 100%
python-flatbuffers-2 34 KB | ##### 100%
opt_einsum-3.3.0 57 KB | ##### 100%
aiohttp-3.8.3 415 KB | ##### 100%
keras-2.10.0 1.5 MB | ##### 100%
libcurl-7.87.0 324 KB | ##### 100%
tensorflow-data-ser 17 KB | ##### 100%
zipp-3.11.0 20 KB | ##### 100%
tensorflow-plugin-w 671 KB | ##### 100%
tensorflow-2.10.0 5.6 MB | ##### 100%
grpcio-1.42.0 1.9 MB | ##### 100%
absl-py-1.3.0 171 KB | ##### 100%
zlib-1.2.13 113 KB | ##### 100%
attrs-22.1.0 84 KB | ##### 100%
tensorflow-2.10.0 5 KB | ##### 100%
gast-0.4.0 13 KB | ##### 100%
tf_flow_select-2.3.0 3 KB | ##### 100%
async-timeout-4.0.2 12 KB | ##### 100%
werkzeug-2.2.2 340 KB | ##### 100%
markdown-3.4.1 148 KB | ##### 100%
rsa-4.7.2 28 KB | ##### 100%
libprotobuf-3.20.3 2.2 MB | ##### 100%
markupsafe-2.1.1 26 KB | ##### 100%
multidict-6.0.2 46 KB | ##### 100%
colorama-0.4.6 32 KB | ##### 100%
frozenlist-1.3.3 40 KB | ##### 100%
protobuf-3.20.3 232 KB | ##### 100%
yarl-1.8.1 80 KB | ##### 100%
termcolor-2.1.0 12 KB | ##### 100%
flatbuffers-2.0.0 1.4 MB | ##### 100%
astunparse-1.6.3 17 KB | ##### 100%
keras-preprocessing 35 KB | ##### 100%
google-pasta-0.2.0 46 KB | ##### 100%
tensorflow-estimator 491 KB | ##### 100%
cachetools-4.2.2 13 KB | ##### 100%
oauthlib-3.2.1 194 KB | ##### 100%
google-auth-2.6.0 83 KB | ##### 100%
blinker-1.4 23 KB | ##### 100%
giflib-5.2.1 88 KB | ##### 100%
flit-core-3.6.0 42 KB | ##### 100%
aiosignal-1.2.0 12 KB | ##### 100%
typing_extensions-4 47 KB | ##### 100%
requests-oauthlib-1 23 KB | ##### 100%
tensorflow-base-2.10 75.4 MB | ##### 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Retrieving notices: ...working... done
(OP1_17) PS C:\Users\diejester\Desktop\учеба\опи\опи_17>
```

Рисунок 8 – Установка пакета TensorFlow (4)



# Фиксирование («заморозка») зависимостей с помощью пакетного менеджера pip:

pip freeze > requirements.txt (5)

requirements.txt – Блокнот

Файл Правка Формат Вид Справка

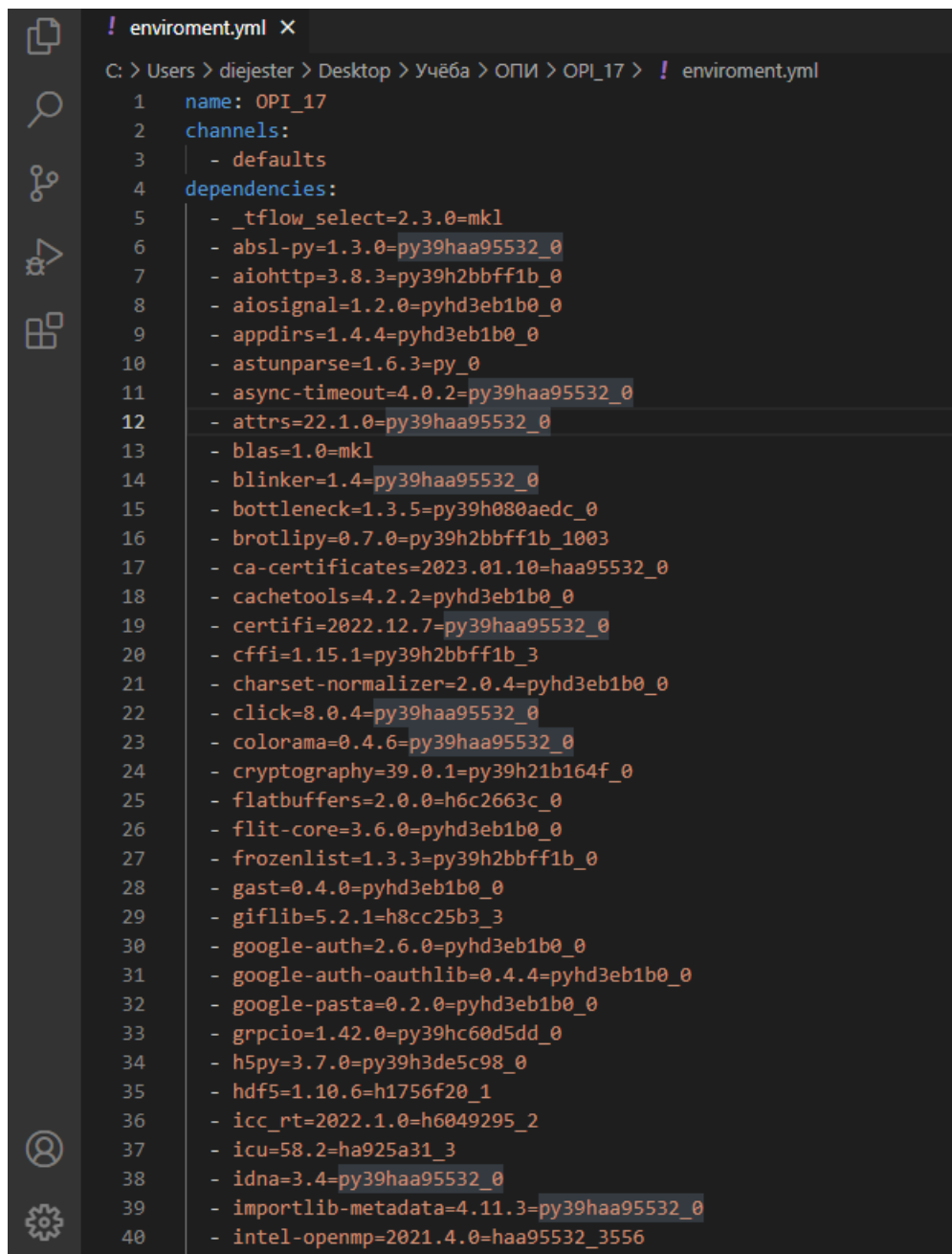
abs1-py @ file:///C:/b/abs\_50a05u75x/croot/abs1-py\_1666362945682/work  
aiosignal @ file:///C:/b/abs\_c4zwy2l696/croot/aiosignal\_1670009573673/work  
aiosignal @ file:///tmp/build/80754af9/aiosignal\_1637843061372/work  
appdirs==1.4.4  
astunparse==1.6.3  
async-timeout @ file:///C:/b/abs\_43oah22a8g/croots/recipe/async-timeout\_1664876362767/work  
attrs @ file:///C:/b/abs\_08s3y775ra/croot/attrs\_1668696195628/work  
blinker==1.4  
Bottleneck @ file:///C:/Windows/Temp/abs\_3198ca53-903d-42fd-87b4-03e6d03a8381yfwisuve8/croots/recipe/bottleneck\_1657175565483/work  
brotlipy==0.7.0  
cachetools @ file:///tmp/build/80754af9/cachetools\_1619597386817/work  
certifi @ file:///C:/b/abs\_85o\_sfm0se/croot/certifi\_1671487778835/work/certifi  
cffi @ file:///C:/b/abs\_49n3v2zhyr/croot/cffi\_1670423218144/work  
charset-normalizer @ file:///tmp/build/80754af9/charset-normalizer\_1630003229654/work  
click @ file:///C:/ci/click\_164603859533/work  
colorama @ file:///C:/b/abs\_89o2q0l032/croot/colorama\_1672387194846/work  
cryptography @ file:///C:/b/abs\_8ecplyc3n2/croot/cryptography\_1677533185000/work  
flatbuffers @ file:///home/ktietz/cip/python-flatbuffers\_1634039120618/work  
flit\_core @ file:///opt/conda/conda-bld/flit\_core\_1644941570762/work/source/flit\_core  
frozenlist @ file:///C:/b/abs\_20b5uugsl/croot/frozenlist\_1670004511812/work  
gast @ file:///Users/ktietz/demo/mc3/conda-bld/gast\_1628588903283/work  
google-auth @ file:///opt/conda/conda-bld/google-auth\_1646735974934/work  
google-auth-oauthlib @ file:///tmp/build/80754af9/google-auth-oauthlib\_1617120569481/work  
google-pasta @ file:///Users/ktietz/demo/mc3/conda-bld/google-pasta\_16308577991354/work  
grpcio @ file:///C:/ci/grpcio\_1637500978642/work  
h5py @ file:///C:/ci/h5py\_1659089875384/work  
idna @ file:///C:/b/abs\_bdnhbebr10a/croot/idna\_1666125572046/work  
importlib-metadata @ file:///C:/ci/importlib-metadata\_1648562621412/work  
keras @ file:///C:/Users/builder/adiapietro/mc3/tf210/conda-bld/keras\_1669760570649/work/keras-2.10.0-py2.py3-none-any.whl  
Keras-Preprocessing @ file:///tmp/build/80754af9/keras-preprocessing\_1612283648596/work  
Markdown @ file:///C:/b/abs\_90lv\_ucina/croot/markdown\_1671541919225/work  
MarkupSafe @ file:///C:/ci/markupsafe\_1654508077284/work  
mk1-fft==1.3.1  
mk1-random @ file:///C:/ci/mk1\_random\_1626186184308/work  
mk1-service==2.4.0  
multidict @ file:///C:/b/abs\_6cx\_8w3cv2/croot/multidict\_1665674238352/work  
numexpr @ file:///C:/b/abs\_a7kbak88hk/croot/numexpr\_1668713882979/work  
numpy @ file:///C:/b/abs\_datshtcer/croot/numpy\_and\_numpy\_base\_1672336199388/work  
oauthlib @ file:///C:/b/abs\_2e0ymqc2ow/croot/oauthlib\_1665490906043/work  
opt-einsum @ file:///tmp/build/80754af9/opt\_einsum\_1621500238896/work  
packaging @ file:///C:/b/abs\_cfsup8ur87/croot/packaging\_1671697442297/work  
pandas @ file:///C:/b/abs\_c6fueztktm/croot/pandas\_1670425103552/work  
pooch @ file:///tmp/build/80754af9/pooch\_1623324770023/work  
protobuf==3.20.3  
pyasn1 @ file:///Users/ktietz/demo/mc3/conda-bld/pyasn1\_1629708007385/work  
pyasn1-modules==0.2.8  
pyparser @ file:///tmp/build/80754af9/pyparser\_1636541352034/work  
PyJWT @ file:///C:/ci/pyjwt\_1657511236979/work  
pyOpenSSL @ file:///C:/b/abs\_552w85x1j2/croot/pyopenssl\_1677687783691/work  
PySocks @ file:///C:/ci/pysocks\_1605307512533/work  
python-dateutil @ file:///tmp/build/80754af9/python-dateutil\_1626374649649/work  
pytz @ file:///C:/b/abs\_22f0vnpn3/croot/pytz\_1671698059064/work  
requests @ file:///C:/ci/requests\_1657735342357/work  
requests-oauthlib==1.3.0  
rsa @ file:///tmp/build/80754af9/rsa\_1614366226499/work  
scipy==1.10.0  
six @ file:///tmp/build/80754af9/six\_1644875935023/work  
tensorboard @ file:///C:/Users/builder/adiapietro/mc3/tf210/conda-bld/tensorboard\_1669760968711/work/tensorboard-2.10.0-py3-none-any.whl  
tensorboard-data-server @ file:///C:/b/abs\_2fhvpo862s/croot/tensorboard-data-server\_1670853600144/work/tensorboard\_data\_server-0.6.1-py3-none-any.whl  
tensorboard-plugin-wit @ file:///C:/tf/b/tensorboard-plugin-wit\_1660162132996/work/tensorboard\_plugin\_wit-1.8.1-py3-none-any.whl  
tensorflow==2.10.0  
tensorflow-estimator @ file:///C:/Users/builder/adiapietro/mc3/tf210/conda-bld/tensorflow-estimator\_1669761460695/work/tensorflow\_estimator-2.10.0-py2.py3-none-any.whl  
termcolor @ file:///C:/b/abs\_16qe73hw7n/croot/termcolor\_1660804642458/work  
typing\_extensions @ file:///C:/b/abs\_89eui86zuq/croot/typing\_extensions\_1669923792806/work

Рисунок 9 – Результат выполнения команды (5). Файл requirements.txt



Запись настроек окружения в файл:

```
conda env export > environment.yml (6)
```



```
! envioment.yml X
C: > Users > diejester > Desktop > Учѐба > ОПИ > OPI_17 > ! envioment.yml

1  name: OPI_17
2  channels:
3    - defaults
4  dependencies:
5    - _tflow_select=2.3.0=mkl
6    - absl-py=1.3.0=py39haa95532_0
7    - aiohttp=3.8.3=py39h2bbff1b_0
8    - aiosignal=1.2.0=pyhd3eb1b0_0
9    - appdirs=1.4.4=pyhd3eb1b0_0
10   - astunparse=1.6.3=py_0
11   - async-timeout=4.0.2=py39haa95532_0
12   - attrs=22.1.0=py39haa95532_0
13   - blas=1.0=mkl
14   - blinker=1.4=py39haa95532_0
15   - bottleneck=1.3.5=py39h080aedc_0
16   - brotli=1.0.7=py39h2bbff1b_1003
17   - ca-certificates=2023.01.10=haa95532_0
18   - cachetools=4.2.2=pyhd3eb1b0_0
19   - certifi=2022.12.7=py39haa95532_0
20   - cffi=1.15.1=py39h2bbff1b_3
21   - charset-normalizer=2.0.4=pyhd3eb1b0_0
22   - click=8.0.4=py39haa95532_0
23   - colorama=0.4.6=py39haa95532_0
24   - cryptography=39.0.1=py39h21b164f_0
25   - flatbuffers=2.0.0=h6c2663c_0
26   - flit-core=3.6.0=pyhd3eb1b0_0
27   - frozenlist=1.3.3=py39h2bbff1b_0
28   - gast=0.4.0=pyhd3eb1b0_0
29   - giflib=5.2.1=h8cc25b3_3
30   - google-auth=2.6.0=pyhd3eb1b0_0
31   - google-auth-oauthlib=0.4.4=pyhd3eb1b0_0
32   - google-pasta=0.2.0=pyhd3eb1b0_0
33   - grpcio=1.42.0=py39hc60d5dd_0
34   - h5py=3.7.0=py39h3de5c98_0
35   - hdf5=1.10.6=h1756f20_1
36   - icc_rt=2022.1.0=h6049295_2
37   - icu=58.2=ha925a31_3
38   - idna=3.4=py39haa95532_0
39   - importlib-metadata=4.11.3=py39haa95532_0
40   - intel-openmp=2021.4.0=haa95532_3556
```

Рисунок 10 – Результат выполнения команды (6). Файл environment.yml