Data Representation

Higher Diploma in Data Analytics

Semester 4 2019

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1.0 Overview

This document provides an overview of the files included in my zip folder, the packages I installed for this project and an outline of the different aspects of the projects.

2.0 Files included

Requirements.txt

Training.html (main html file)

Login.html (hyperlinked page)

Server folder (included server.py)

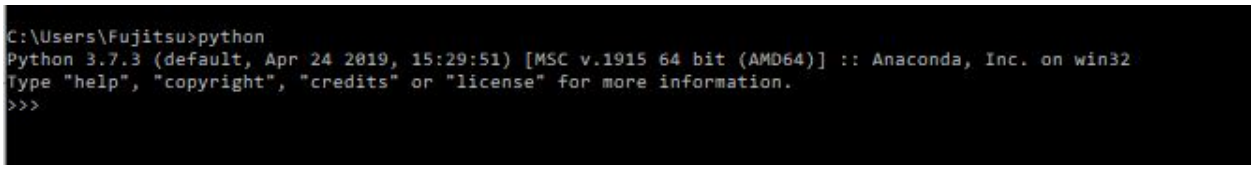
Images folder (included images from the html page

Application folder contains trainingDAO.py

Dbconfig.py includes my local host login details (running wamp server)

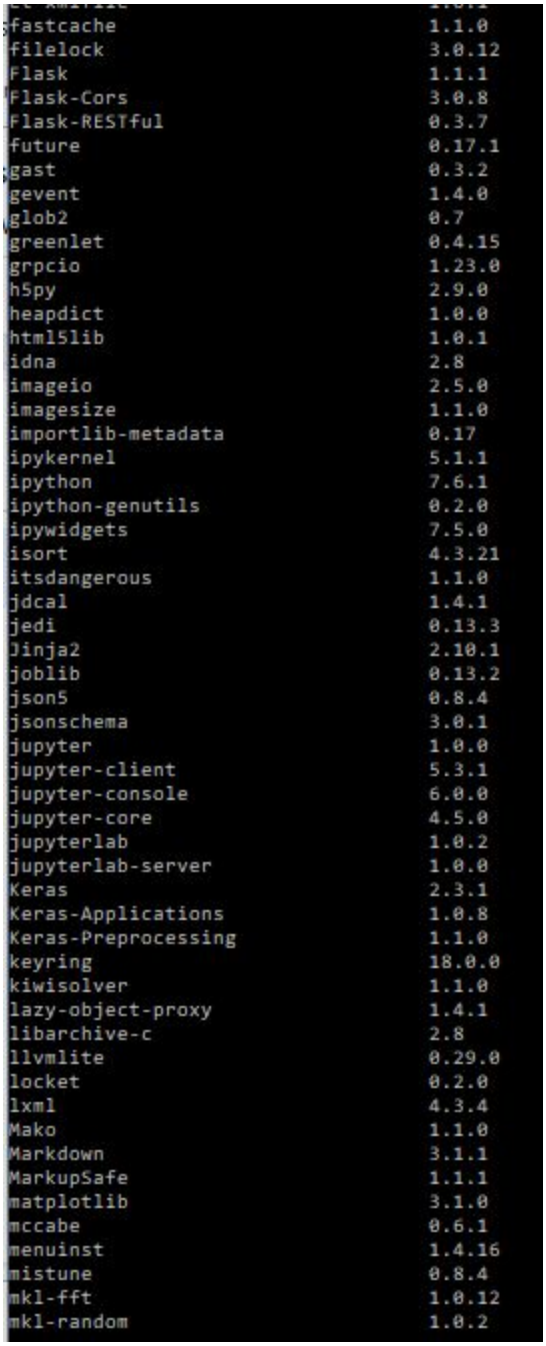
3.0 Packages installed

3.1 Python



3.2 Pip list (Python Package Installer)

```
C:\Users\Fujitsu>pip list
Package                           Version
--------------------------------- ---------
absl-py                           0.8.1
alabaster                         0.7.12
anaconda-client                   1.7.2
anaconda-navigator                1.9.7
anaconda-project                  0.8.3
aniso8601                         8.0.0
asn1crypto                        0.24.0
astor                             0.7.1
astroid                           2.2.5
astropy                           3.2.1
atomicwrites                      1.3.0
attrs                             19.1.0
Babel                             2.7.0
backcall                          0.1.0
backports.functools-lru-cache     1.5
backports.os                      0.1.1
backports.shutil-get-terminal-size 1.0.0
backports.tempfile                1.0
backports.weakref                 1.0.post1
beautifulsoup4                    4.7.1
bitarray                          0.9.3
bkcharts                          0.2
bleach                            3.1.0
bokeh                             1.2.0
boto                              2.49.0
Bottleneck                        1.2.1
certifi                           2019.6.16
cffi                              1.12.3
chardet                           3.0.4
Click                             7.0
cloudpickle                       1.2.1
clyent                            1.2.2
colorama                          0.4.1
comtypes                          1.1.7
conda                             4.7.12
conda-build                       3.18.8
conda-package-handling            1.3.11
conda-verify                      3.4.2
contextlib2                       0.5.5
cryptography                      2.7
cycler                            0.10.0
Cython                            0.29.12
cytoolz                           0.10.0
dask                              2.1.0
decorator                         4.4.0
defusedxml                        0.6.0
distributed                       2.1.0
docutils                          0.14
entrypoints                       0.3
et-xmlfile                        1.0.1
```



```
fastcache                     1.1.0
filelock                      3.0.12
Flask                         1.1.1
Flask-Cors                    3.0.8
Flask-RESTful                 0.3.7
future                        0.17.1
gast                          0.3.2
gevent                        1.4.0
glob2                         0.7
greenlet                      0.4.15
grpcio                        1.23.0
h5py                          2.9.0
heapdict                      1.0.0
html5lib                      1.0.1
idna                          2.8
imageio                       2.5.0
imagesize                     1.1.0
importlib-metadata            0.17
ipykernel                     5.1.1
ipython                       7.6.1
ipython-genutils              0.2.0
ipywidgets                    7.5.0
isort                         4.3.21
itsdangerous                  1.1.0
jdcal                         1.4.1
jedi                          0.13.3
Jinja2                        2.10.1
joblib                        0.13.2
json5                         0.8.4
jsonschema                    3.0.1
jupyter                       1.0.0
jupyter-client                5.3.1
jupyter-console               6.0.0
jupyter-core                  4.5.0
jupyterlab                    1.0.2
jupyterlab-server             1.0.0
Keras                         2.3.1
Keras-Applications            1.0.8
Keras-Preprocessing           1.1.0
keyring                       18.0.0
kiwisolver                    1.1.0
lazy-object-proxy             1.4.1
libarchive-c                  2.8
llvmlite                      0.29.0
locket                        0.2.0
lxml                          4.3.4
Mako                          1.1.0
Markdown                      3.1.1
MarkupSafe                    1.1.1
matplotlib                    3.1.0
mccabe                        0.6.1
menuinst                      1.4.16
mistune                       0.8.4
mkl-fft                       1.0.12
mkl-random                    1.0.2
```

```
mkl-service                   2.0.2
mock                          3.0.5
more-itertools                7.0.0
mpmath                        1.1.0
msgpack                       0.6.1
multipledispatch              0.6.0
mysql-connector               2.2.9
navigator-updater             0.2.1
nbconvert                     5.5.0
nbformat                      4.4.0
networkx                      2.3
nltk                          3.4.4
nose                          1.3.7
notebook                      6.0.0
numba                         0.44.1
numexpr                       2.6.9
numpy                         1.16.4
numpydoc                      0.9.1
olefile                       0.46
openpyxl                      2.6.2
packaging                     19.0
pandas                        0.24.2
pandocfilters                 1.4.2
parso                         0.5.0
partd                         1.0.0
path.py                       12.0.1
pathlib2                      2.3.4
patsy                         0.5.1
pep8                          1.7.1
pickleshare                   0.7.5
Pillow                        6.1.0
pip                           19.3.1
pkginfo                       1.5.0.1
pluggy                        0.12.0
ply                           3.11
prometheus-client             0.7.1
prompt-toolkit                2.0.9
protobuf                      3.11.1
psutil                        5.6.3
py                            1.8.0
pycodestyle                   2.5.0
pycosat                       0.6.3
pycparser                     2.19
pycrypto                      2.6.1
pycurl                        7.43.0.3
pyflakes                      2.1.1
Pygments                      2.4.2
pygpu                         0.7.6
pylint                        2.3.1
pyodbc                        4.0.26
pyOpenSSL                     19.0.0
pyparsing                     2.4.0
pyreadline                    2.1
pyrsistent                    0.14.11
PySocks                       1.7.0
```

```
pytest-arraydiff                0.3
pytest-astropy                  0.5.0
pytest-doctestplus              0.3.0
pytest-openfiles                0.3.2
pytest-remotedata               0.3.1
python-dateutil                 2.8.0
python-dotenv                   0.10.3
pytz                            2019.1
PyWavelets                      1.0.3
pywin32                         223
pywinpty                        0.5.5
PyYAML                          5.1.1
pyzmq                           18.0.0
QtAwesome                       0.5.7
qtconsole                       4.5.1
QtPy                            1.8.0
requests                        2.22.0
rope                            0.14.0
ruamel-yaml                     0.15.46
scikit-image                    0.15.0
scikit-learn                    0.21.2
scipy                           1.2.1
seaborn                         0.9.0
Send2Trash                      1.5.0
setuptools                      41.0.1
simplegeneric                   0.8.1
singledispatch                  3.4.0.3
six                             1.12.0
snowballstemmer                 1.9.0
sortedcollections               1.1.2
sortedcontainers                2.1.0
soupsieve                       1.8
Sphinx                          2.1.2
sphinxcontrib-applehelp         1.0.1
sphinxcontrib-devhelp           1.0.1
sphinxcontrib-htmlhelp          1.0.2
sphinxcontrib-jsmath            1.0.1
sphinxcontrib-qthelp            1.0.2
sphinxcontrib-serializinghtml   1.1.3
sphinxcontrib-websupport        1.1.2
spyder                          3.3.6
spyder-kernels                  0.5.1
SQLAlchemy                      1.3.5
statsmodels                     0.10.0
sympy                           1.4
tables                          3.5.2
tblib                           1.4.0
tensorboard                     1.13.1
tensorflow                      1.13.1
tensorflow-estimator            1.13.0
termcolor                       1.1.0
terminado                       0.8.2
testpath                        0.4.2
Theano                          1.0.4
toolz                           0.10.0
```

```
statsmodels                     0.10.0
sympy                           1.4
tables                          3.5.2
tblib                           1.4.0
tensorboard                     1.13.1
tensorflow                      1.13.1
tensorflow-estimator            1.13.0
termcolor                       1.1.0
terminado                       0.8.2
testpath                        0.4.2
Theano                          1.0.4
toolz                           0.10.0
tornado                         6.0.3
tqdm                            4.32.1
traitlets                       4.3.2
unicodecsv                      0.14.1
urllib3                         1.24.2
virtualenv                      16.7.9
wcwidth                         0.1.7
webencodings                    0.5.1
Werkzeug                        0.15.4
wheel                           0.33.4
widgetsnbextension              3.5.0
win-inet-pton                   1.1.0
win-unicode-console             0.5
wincertstore                    0.2
wrapt                           1.11.2
xlrd                            1.2.0
XlsxWriter                      1.1.8
xlwings                         0.15.8
xlwt                            1.3.0
zict                            1.0.0
zipp                            0.5.1
```

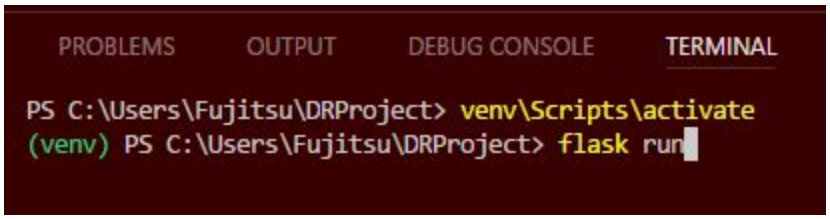
3.3 Mysql connector

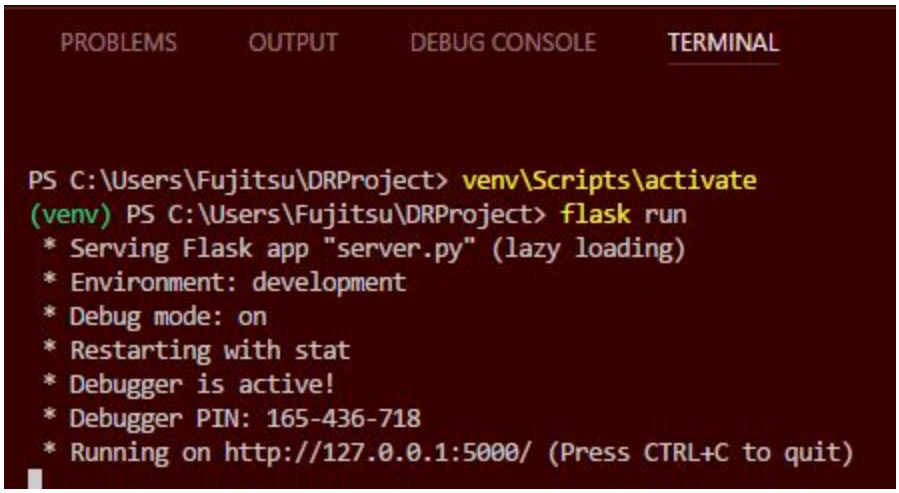
```
C:\Users\Fujitsu>pip install mysql-connector
Collecting mysql-connector
  Downloading https://files.pythonhosted.org/packages/28/04/e40098f3730e75bbe36a338926f566ea803550a34fb50535499f4fc4787a/mysql-connector-2.2.9.tar.gz (11.9MB)
     |████████████████████████████████| 11.9MB 68kB/s
Building wheels for collected packages: mysql-connector
  Building wheel for mysql-connector (setup.py) ... done
  Created wheel for mysql-connector: filename=mysql_connector-2.2.9-cp37-cp37m-win_amd64.whl size=247952 sha256=3504b15737dbf1ac5c8ce8ccb498ef19737b4beb04bf9e8b31bb1bd80e47674e
  Stored in directory: C:\Users\Fujitsu\AppData\Local\pip\Cache\wheels\8c\83\a1\f8b6d4bb1bd6208bbde1608bbfa7557504bed9eaf2ecf8c175
Successfully built mysql-connector
Installing collected packages: mysql-connector
Successfully installed mysql-connector-2.2.9
```

3.4 Flask version

```
C:\Users\Fujitsu>flask --version
Python 3.7.3
Flask 1.1.1
Werkzeug 0.15.4
```

3.5 Installed and activate a virtual environment





3.6 Installed wamp server for mysql and created table

c:\wamp64\bin\mysql\mysql8.0.18\bin\mysql.exe

```
mysql> create database datarep;
Query OK, 1 row affected (0.56 sec)

mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| datarep            |
| information_schema |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
5 rows in set (0.05 sec)

mysql> use datarep
Database changed
mysql> show tables;
Empty set (0.70 sec)

mysql> create table training (
    -> id int NOT NULL AUTO_INCREMENT,
    -> Course Name varchar(250),
    -> ^C
mysql> use datarep
Database changed
mysql> create table training (
    -> id int NOT NULL AUTO_INCREMENT,
    -> course_name varchar(250),
    -> price int,
    -> PRIMARY KEY(id)
    -> );
Query OK, 0 rows affected (0.69 sec)

mysql> show tables;
+-------------------+
| Tables_in_datarep |
+-------------------+
| training          |
+-------------------+
1 row in set (0.06 sec)

mysql> desc training;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| id          | int(11)      | NO   | PRI | NULL    | auto_increment |
| course_name | varchar(250) | YES  |     | NULL    |                |
| price       | int(11)      | YES  |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
3 rows in set (0.21 sec)
```

3.7 Table 2 users created:

```
mysql> use datarep;
Database changed
mysql> show tables;
+-------------------+
| Tables_in_datarep |
+-------------------+
| training          |
| users             |
+-------------------+
2 rows in set (0.00 sec)

mysql> describe training;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| id          | int(11)      | NO   | PRI | NULL    | auto_increment |
| course_name | varchar(250) | YES  |     | NULL    |                |
| price       | int(11)      | YES  |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
3 rows in set (0.00 sec)

mysql> describe users;
+---------+--------------+------+-----+---------+----------------+
| Field   | Type         | Null | Key | Default | Extra          |
+---------+--------------+------+-----+---------+----------------+
| user_id | int(11)      | NO   | PRI | NULL    | auto_increment |
| name    | varchar(100) | YES  |     | NULL    |                |
| email   | varchar(200) | YES  |     | NULL    |                |
| id      | int(11)      | YES  |     | NULL    |                |
+---------+--------------+------+-----+---------+----------------+
4 rows in set (0.00 sec)
```

3.8 Insert into table:

```
mysql> insert into training (course_name, price) values ('Mindfulness', 25.00);
Query OK, 1 row affected (1.22 sec)

mysql> select * from training;
+----+-------------+-------+
| id | course_name | price |
+----+-------------+-------+
|  1 | Mindfulness |    25 |
+----+-------------+-------+
```

3.9 Updated table:

```
mysql> update training set price = '35' where id = 1;
Query OK, 1 row affected (0.07 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

3.10 Delete row from table:

```
mysql> select * from training;
+----+-------------+-------+
| id | course_name | price |
+----+-------------+-------+
|  1 | Mindfulness |    35 |
|  2 | Nutrition   |    30 |
+----+-------------+-------+
2 rows in set (0.00 sec)

mysql> use datarep;
Database changed
mysql> delete from training where id = 1;
Query OK, 1 row affected (0.47 sec)

mysql> use datarep;
Database changed
mysql> select * from training;
+----+-------------+-------+
| id | course_name | price |
+----+-------------+-------+
|  2 | Nutrition   |    30 |
+----+-------------+-------+
1 row in set (0.00 sec)
```

3.11 Insert into users table:

```
mysql> use datarep;
Database changed
mysql> insert into users (name, email) values ('Mary', 'mary@test.com');
Query OK, 1 row affected (0.35 sec)
```

4.0 REST API[1]

[2]

REST API stands for Representational State Transfer API which is an architectural style designed for distributed hypermedia, or an Application Programming Interface(API).
API can be defined as a web service conforming to the architectural principles of REST. Each API is called by issuing a standard HTTP request method: POST, GET, PUT, and less

[1] https://www.bmc.com/blogs/rest-vs-crud-whats-the-difference/
[2] https://www.vectorstock.com/royalty-free-vector/representational-state-transfer-rest-api-vector-26953989

commonly, DELETE. In REST, a resource is anything that can be pointed to via a HTTP protocol. For example, an image, a website, a document, etc. REST offers an alternative to Simple Object Access Protocol (SOAP), COBRA, RMI, and many others

Principles of REST API
• Client-Server Mandate
• Statelessness
• Cache
• Interface / Uniform Contract
• Layered System
• Optional: Code-On-Demand

5.0 CRUD Operations

CRUD is an acronym for CREATE, READ, UPDATE, DELETE. These form the standard database commands which are known as the foundation of CRUD. The principles of the CRUD cycle are defined as CREATE, READ/RETRIEVE, UPDATE, and DELETE.

Principles of CRUD[3]
• CREATE procedures in order to generate new records via INSERT statements.
• READ procedures reads the data based on input parameters. RETRIEVE procedures grab records based on input parameters.
• UPDATE procedures modify records without overwriting them.
• DELETE procedures delete the specified record.

[3] https://www.bmc.com/blogs/rest-vs-crud-whats-the-difference/

In summary, REST is an architectural system centered around resources via HTTP protocols. On the other hand, CRUD is a cycle used for maintaining records in a database. CRUD principles are mapped to REST commands to comply with the purpose of RESTful architecture.

REST API values in comparison to CRUD[4]

HTTP Verb	CRUD	Entire Collection (e.g. /customers)	Specific Item (e.g. /customers/{id})
POST	Create	201 (Created), 'Location' header with link to /customers/{id} containing new ID.	404 (Not Found), 409 (Conflict) if resource already exists..
GET	Read	200 (OK), list of customers. Use pagination, sorting and filtering to navigate big lists.	200 (OK), single customer. 404 (Not Found), if ID not found or invalid.
PUT	Update/Replace	405 (Method Not Allowed), unless you want to update/replace every resource in the entire collection.	200 (OK) or 204 (No Content). 404 (Not Found), if ID not found or invalid.
PATCH	Update/Modify	405 (Method Not Allowed), unless you want to modify the collection itself.	200 (OK) or 204 (No Content). 404 (Not Found), if ID not found or invalid.
DELETE	Delete	405 (Method Not Allowed), unless you want to delete the whole collection—not often desirable.	200 (OK). 404 (Not Found), if ID not found or invalid.

6.0 Flash Server[5]

Flask is a web framework. Using Flask provides us with tools, libraries and technologies required to build a web application. Flask is part of the categories of the micro-framework. The flask framework is light, there are few dependencies to update. Additional plugins can be added to flask as required. Flask dependencies are Werkzeug (a WSGI utility library) and jinja2 which is its template engine.

7.0 WAMP Server[6]

WAMP is an acronym which stands for Windows, Apache, MySQL, and PHP. It's a software stack meaning installing WAMP installs Apache, MySQL, and PHP on your operating system. WAMP derives from LAMP where the L stands for Linux. The only difference between the two is that WAMP is used for Windows and LAMP is used for Linux based operating systems.

[4] https://www.restapitutorial.com/lessons/httpmethods.html
[5] https://pymbook.readthedocs.io/en/latest/flask.html
[6] https://pymbook.readthedocs.io/en/latest/flask.html

WAMP Server
• "W" stands for Windows
• "A" refers to Apache. Apache is the server software that is responsible for serving web pages. When you request a page to be viewed, Apache grants the request over HTTP and displays the site.
• "M" refers to MySQL. MySQL's goal is to be the database management system for your server. It stores all of the relevant information like your site's content, user profiles, etc.
• "P" stands for PHP. PHP is running in conjunction with Apache and communicating with MySQL.

8.0 References

https://beginner-sql-tutorial.com/sql-use-database.htm
w3schools.com/sql/
https://medium.com/@sametgirgin/rest-api-crud-example-in-python-using-flask-and-mysql-8eea922d533e
https://programminghistorian.org/en/lessons/creating-apis-with-python-and-flask
https://codeburst.io/this-is-how-easy-it-is-to-create-a-rest-api-8a25122ab1f3
https://kite.com/blog/python/flask-restful-api-tutorial/
https://www.youtube.com/watch?v=j2v2r6ByjJI
https://www.bmc.com/blogs/rest-vs-crud-whats-the-difference/
https://www.vectorstock.com/royalty-free-vector/representational-state-transfer-rest-api-vector-26953989
https://www.restapitutorial.com/lessons/httpmethods.html