

Welcome to WEEK2 of SWE3032

Tutorial using Titanic dataset

This week we'll learn how to load the Titanic survivor dataset available on [Kaggle](https://www.kaggle.com/c/titanic/data) (<https://www.kaggle.com/c/titanic/data>) and explore the dataset with visualization.



<https://www.kaggle.com/c/titanic/data> (<https://www.kaggle.com/c/titanic/data>)

The Challenge The sinking of the Titanic is one of the most infamous shipwrecks in history.

On April 15, 1912, during her maiden voyage, the widely considered “unsinkable” RMS Titanic sank after colliding with an iceberg. Unfortunately, there weren’t enough lifeboats for everyone onboard, resulting in the death of 1502 out of 2224 passengers and crew.

While there was some element of luck involved in surviving, it seems some groups of people were more likely to survive than others.

In this challenge, we ask you to build a predictive model that answers the question: “**what sorts of people were more likely to survive?**” using passenger data (ie name, age, gender, socio-economic class, etc).

In [1]:

```
# import packages
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

import torch
from torch.utils.data import DataLoader

from google.colab import files
import io
import warnings

warnings.filterwarnings(action='ignore')
```

In [2]:

```
# import the Titanic dataset as a training dataset
uploaded = files.upload()
```

파일 선택 선택된 파일 없음

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Saving train.csv to train.csv

In [3]:

```
train = pd.read_csv(io.BytesIO(uploaded['train.csv']))
train.head(5)
```

Out[3]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250
3	4	1	1	Futelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500

Data Dictionary

Variable	Definition	Key
survival	Survival	0 = No, 1 = Yes
pclass	Ticket class	1 = 1st, 2 = 2nd, 3 = 3rd
sex	Sex	
Age	Age in years	
sibsp	# of siblings / spouses aboard the Titanic	
parch	# of parents / children aboard the Titanic	
ticket	Ticket number	
fare	Passenger fare	
cabin	Cabin number	
embarked	Port of Embarkation	C = Cherbourg, Q = Queenstown, S = Southampton

Variable Notes

pclass: A proxy for socio-economic status (SES)

1st = Upper

2nd = Middle

3rd = Lower

age: Age is fractional if less than 1. If the age is estimated, is it in the form of xx.5

sibsp: The dataset defines family relations in this way...

Sibling = brother, sister, stepbrother, stepsister

Spouse = husband, wife (mistresses and fiancés were ignored)

parch: The dataset defines family relations in this way...

Parent = mother, father

Child = daughter, son, stepdaughter, stepson

Some children travelled only with a nanny, therefore parch=0 for them.

In [4]:

```
uploaded = files.upload()
test = pd.read_csv(io.BytesIO(uploaded['test.csv']))
print(test.shape)
```

파일 선택 선택된 파일 없음

Upload widget is only available when the cell has been executed in the current browser session.
Please rerun this cell to enable.

Saving test.csv to test.csv
(418, 11)

In [5]:

```
train.dtypes
```

Out[5]:

```
PassengerId    int64
Survived        int64
Pclass          int64
Name            object
Sex             object
Age            float64
SibSp           int64
Parch           int64
Ticket          object
Fare            float64
Cabin           object
Embarked        object
dtype: object
```

In [6]:

```
train.isnull().sum()
```

Out[6]:

```
PassengerId    0
Survived        0
Pclass          0
Name            0
Sex             0
Age            177
SibSp           0
Parch           0
Ticket          0
Fare            0
Cabin          687
Embarked        2
dtype: int64
```

Load the dataset in a different way

In [7]:

```
# Load datasets from google drive  
from google.colab import drive  
drive.mount('/content/gdrive/')
```

Mounted at /content/gdrive/

In [8]:

```
# Load datasets from Kaggle
# https://www.kaggle.com/general/51898
# 1. Download the Kaggle API token at account page
# 2. Mount the Google drive
# 3. Upload the "kaggle.json" file into the folder in google drive where you want to download
    the Kaggle dataset.
# 4. Install Kaggle API
# 5. Change the current working directory to where you want to download the Kaggle dataset.
# 6. Run the following code to configure the path to "kaggle.json" .
# 7. Download the dataset.
```

```
!pip install kaggle
%cd /content/drive/MyDrive/swe3032/titanic
```

```
import os
os.environ['KAGGLE_CONFIG_DIR'] = "/content/drive/MyDrive/swe3032/titanic"
```

```
!kaggle competitions download -c titanic
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: kaggle in /usr/local/lib/python3.7/dist-packages (1.5.12)
Requirement already satisfied: six>=1.10 in /usr/local/lib/python3.7/dist-packages (from kaggle) (1.15.0)
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from kaggle) (4.64.0)
Requirement already satisfied: python-dateutil in /usr/local/lib/python3.7/dist-packages (from kaggle) (2.8.2)
Requirement already satisfied: python-slugify in /usr/local/lib/python3.7/dist-packages (from kaggle) (6.1.2)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from kaggle) (1.24.3)
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from kaggle) (2.23.0)
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from kaggle) (2022.6.15)
Requirement already satisfied: text-unidecode>=1.3 in /usr/local/lib/python3.7/dist-packages (from python-slugify->kaggle) (1.3)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests->kaggle) (2.10)
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from requests->kaggle) (3.0.4)
[Errno 2] No such file or directory: '/content/drive/MyDrive/swe3032/titanic'
/content
Traceback (most recent call last):
  File "/usr/local/bin/kaggle", line 5, in <module>
    from kaggle.cli import main
  File "/usr/local/lib/python3.7/dist-packages/kaggle/__init__.py", line 23, in <module>
    api.authenticate()
  File "/usr/local/lib/python3.7/dist-packages/kaggle/api/kaggle_api_extended.py", line 166, in authenticate
    self.config_file, self.config_dir))
OSError: Could not find kaggle.json. Make sure it's located in /content/drive/MyDrive/swe3032/titanic. Or use the environment method.
```

change the data into numbers

In [9]:

```
# changing the "male" and "female" into 0 and 1 respectively
train['Sex'] = train["Sex"].replace({"male" : 0})
train['Sex'] = train["Sex"].replace({"female" : 1})
test['Sex'] = test["Sex"].replace({"male" : 0, "female" : 1})
train['Sex'].value_counts()
```

Out[9]:

```
0    577
1    314
Name: Sex, dtype: int64
```

In [10]:

```
print('# of NULL data of variable Sex: ', train['Sex'].isnull().sum())
```

of NULL data of variable Sex: 0

Problem 1

Change 'Embarked' data into numbers! for the null values, choose your own method(most frequent embarked data, or else)

(1 point)

In [11]:

```
# change Embarked data into numbers! for the null values, choose your own method(most frequent e
mbarked data... or else)
train['Embarked'] = train['Embarked'].replace({"C" : 1})
train['Embarked'] = train['Embarked'].replace({"S" : 2})
train['Embarked'] = train['Embarked'].replace({"Q" : 3})
train['Embarked'].fillna(0, inplace = True)
test['Embarked'] = test['Embarked'].replace({"C" : 1, "S" : 2, "Q" : 3})
train['Embarked'].value_counts()
```

Out[11]:

```
2.0    644
1.0    168
3.0     77
0.0      2
Name: Embarked, dtype: int64
```

In [12]:

```
print('# of NULL data of variable Embarked: ', train['Embarked'].isnull().sum())
```

of NULL data of variable Embarked: 0

Data scaling

In [13]:

```
train.describe()
```

Out[13]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch
count	891.000000	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	0.352413	29.699118	0.523008	0.381594
std	257.353842	0.486592	0.836071	0.477990	14.526497	1.102743	0.806057
min	1.000000	0.000000	1.000000	0.000000	0.420000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	0.000000	20.125000	0.000000	0.000000
50%	446.000000	0.000000	3.000000	0.000000	28.000000	0.000000	0.000000
75%	668.500000	1.000000	3.000000	1.000000	38.000000	1.000000	0.000000
max	891.000000	1.000000	3.000000	1.000000	80.000000	8.000000	6.000000

Problem 2

change the Age data with normalization

$(data - data.mean) / data.std$

1 points

In [14]:

```
# fill the nan values withs mean values.
train['Age'].fillna(train['Age'].mean(), inplace = True)
# change the Age data with normalization ( (data - data.mean)/data.std)
train['Age'] = (train['Age'] - train['Age'].mean()) / train['Age'].std()
print(train['Age'])
```

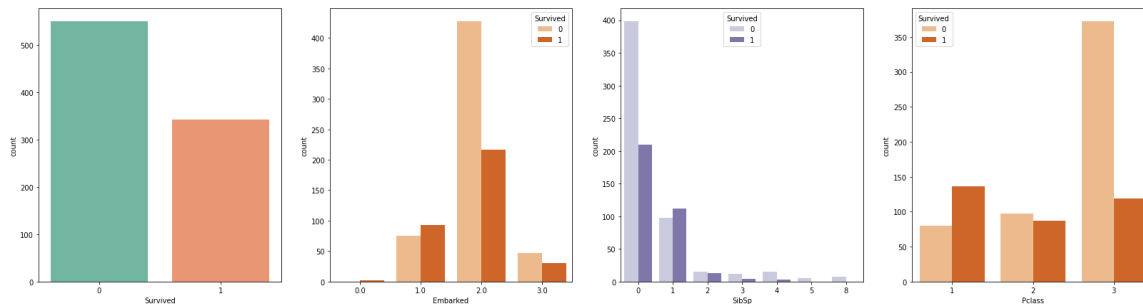
```
0    -0.592148
1     0.638430
2    -0.284503
3     0.407697
4     0.407697
...
886   -0.207592
887   -0.822881
888    0.000000
889   -0.284503
890    0.176964
Name: Age, Length: 891, dtype: float64
```


In [15]:

```
fig, ax = plt.subplots(1,4,figsize=(28, 7))
sns.countplot(train.Survived, palette="Set2", ax=ax[0])
sns.countplot(train.Embarked, hue=train.Survived, ax=ax[1], palette="Oranges")
sns.countplot(train.SibSp, hue=train.Survived, ax=ax[2], palette="Purples")
sns.countplot(train.Pclass, hue=train.Survived, ax=ax[3], palette="Oranges")
```

Out [15]:

<matplotlib.axes._subplots.AxesSubplot at 0x7fadc400d050>

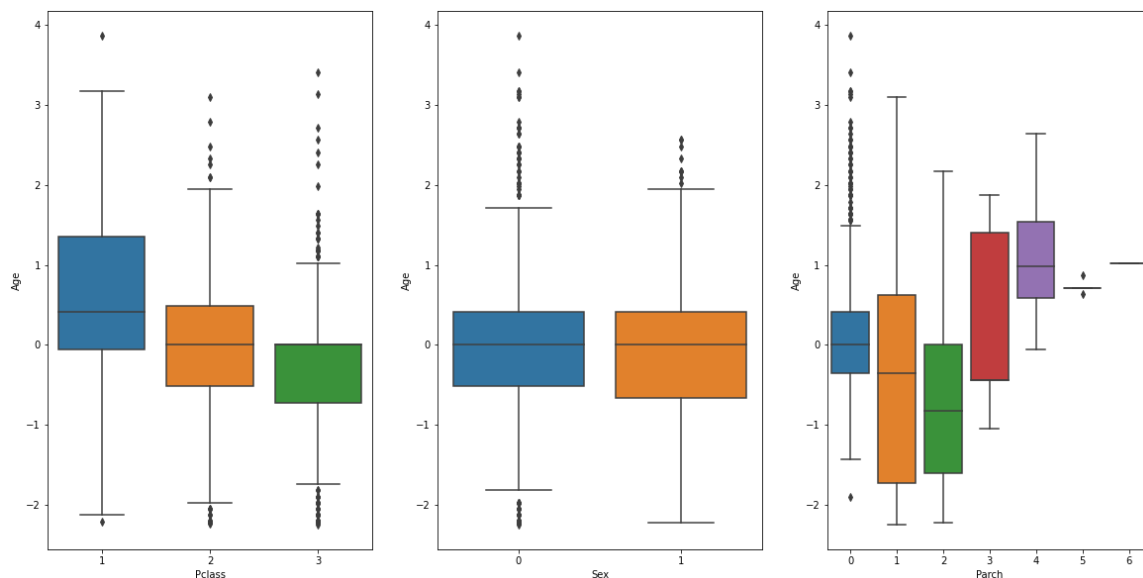


In [16]:

```
fig, ax = plt.subplots(1,3,figsize=(20,10))
sns.boxplot(x='Pclass',y='Age',data=train, ax=ax[0])
sns.boxplot(x='Sex',y='Age',data=train, ax=ax[1])
sns.boxplot(x='Parch',y='Age',data=train, ax=ax[2])
```

Out [16]:

<matplotlib.axes._subplots.AxesSubplot at 0x7fadc39da710>

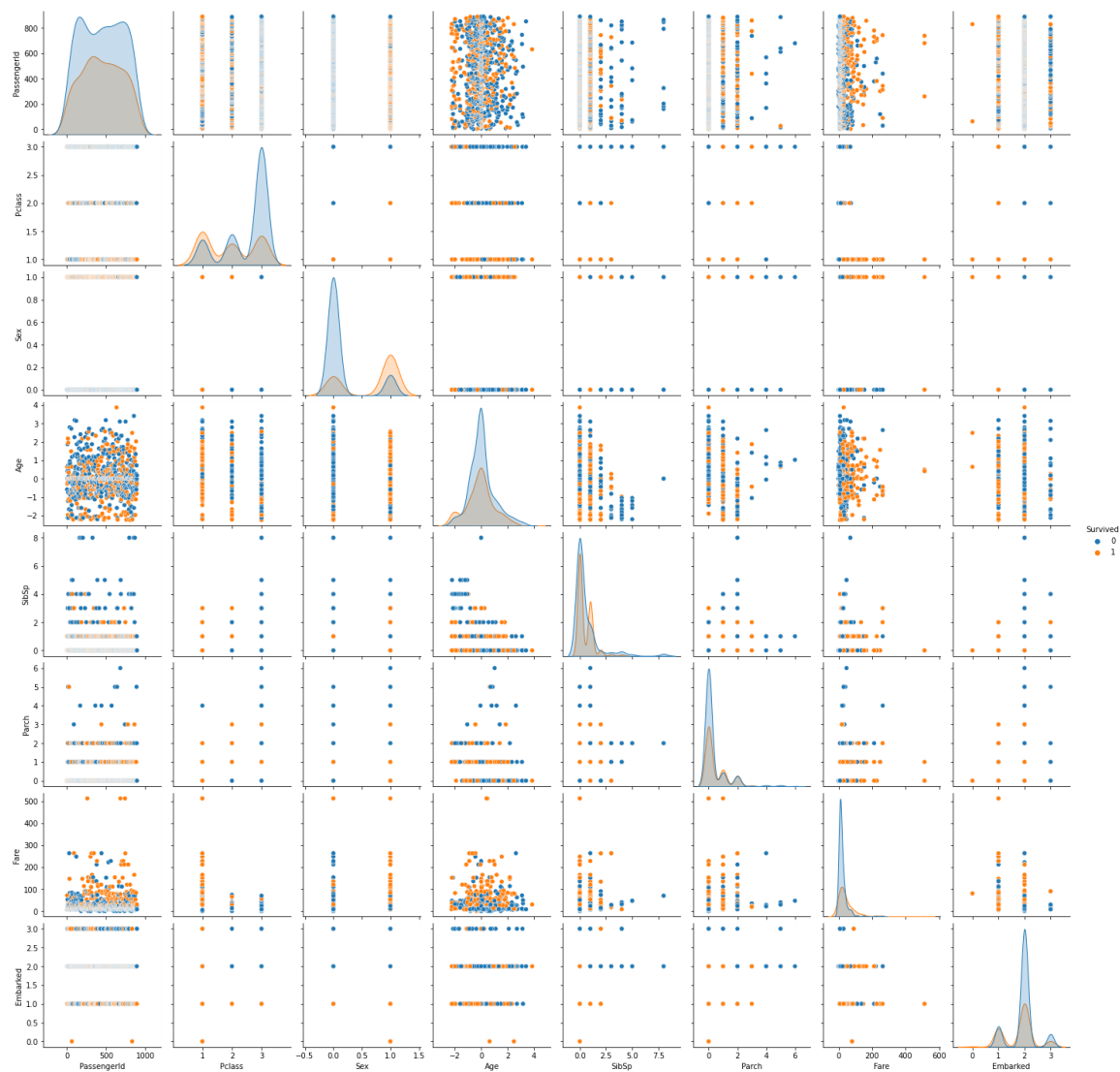


In [17]:

```
sns.pairplot(train, hue = "Survived")
```

Out[17]:

<seaborn.axisgrid.PairGrid at 0x7fadc3eab9d0>



Insight

- people who survived and not survived is not balancing.
- write down the insights you found on the visualization above

Problem 3

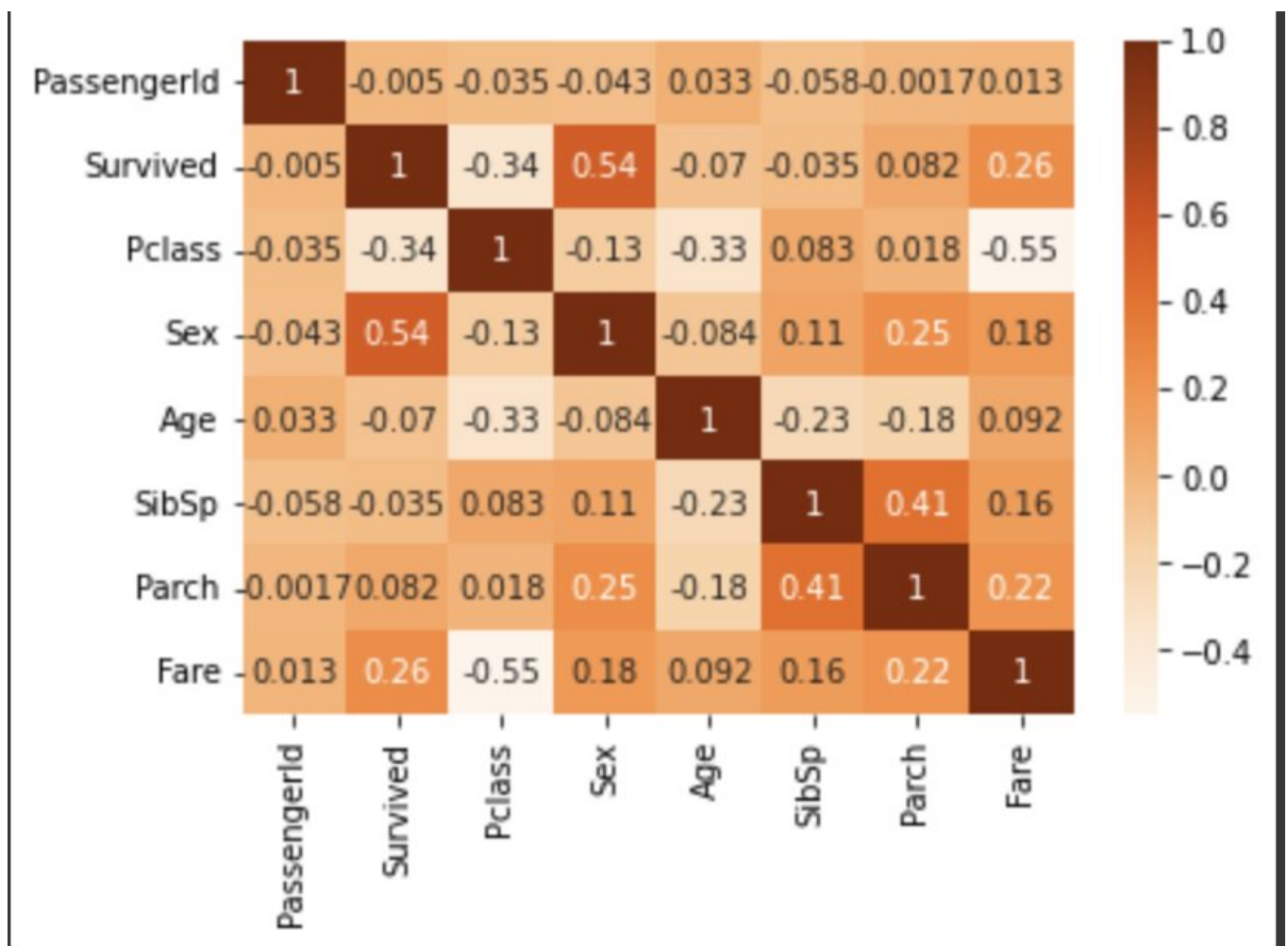
Write down the insights you can find on figures above

Write more than two insights

1 points

In [18]:

```
# write down the insights here or at Markdown right above
# 남성이 여성보다 많이 생존했다 생존비율은 여성이 훨씬높다
# 3Pclass의 사람들은 다른 클래스의 탑승객보다 사망률이 높았다
# 젊은 여성들이 많이 살아남았다 그에비해 남성들은 10대 빼고는 살아남은 비율이 매우 적었다
```

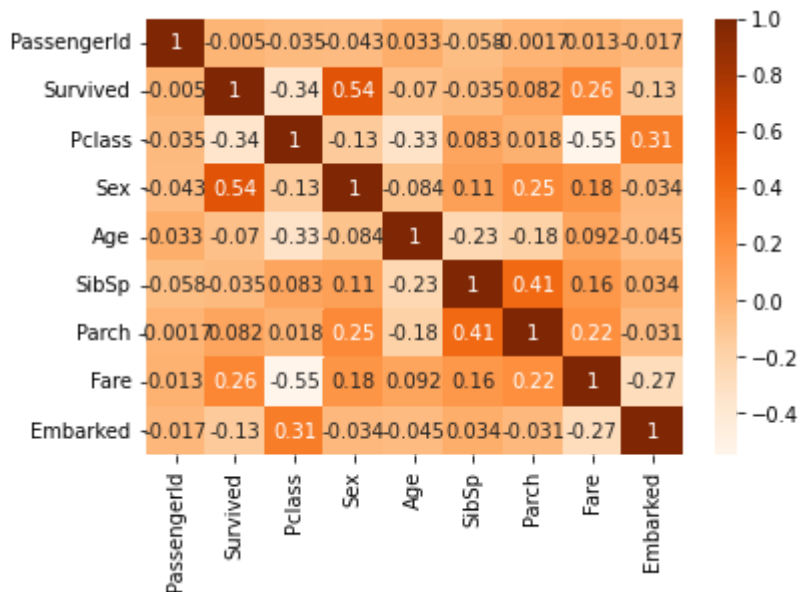


In [19]:

```
sns.heatmap(train.corr(), annot = True, cmap='Oranges')
```

Out[19]:

<matplotlib.axes._subplots.AxesSubplot at 0x7fadbf618bd0>



Drop ineffective datas

In [20]:

```
#for example, if you think that passengerId is not related with survival, we should drop passengerId
# train.drop(['PassengerId'], axis=1, inplace=True)
# test.drop(['PassengerId'], axis=1, inplace=True)
```

In [21]:

```
# Prepare your data for training with DataLoaders
train_dataloader = DataLoader(train, batch_size = 64, shuffle=True)
test_dataloader = DataLoader(test, batch_size = 64, shuffle=True)
```

Extra analysis

In [22]:

```
# import the Titanic dataset as a training dataset
uploaded = files.upload()
train = pd.read_csv(io.BytesIO(uploaded['train.csv']))

# transform numeric variable age to categorical variable
bins = [0, 10, 20, 30, 40, 50, 60, 70, 80, 90]
labels = ['<10', '<20', '<30', '<40', '<50', '<60', '<70', '<80', '<90']
train['Age_cat'] = pd.cut(train['Age'], bins, right=False, labels=labels)
```

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Saving train.csv to train (1).csv

In [23]:

```
# aggregate how many survived passenger were according to sex and ages
train.groupby(['Sex', 'Age_cat'])['Survived'].sum().unstack('Age_cat')
```

Out[23]:

Age_cat	<10	<20	<30	<40	<50	<60	<70	<80	<90
Sex									
female	19	34	52	50	22	16	4	0	0
male	19	7	25	23	12	4	2	0	1

In [24]:

```
# aggregate how many passenger were according to sex and ages
train.groupby(['Sex', 'Age_cat'])['Survived'].count().unstack('Age_cat')
```

Out[24]:

Age_cat	<10	<20	<30	<40	<50	<60	<70	<80	<90
Sex									
female	30	45	72	60	32	18	4	0	0
male	32	57	148	107	57	30	15	6	1

In [25]:

```
# Ratio = Number of survived paseengers / Number of paseengers
round(train.groupby(['Sex', 'Age_cat'])['Survived'].sum().unstack('Age_cat')/train.groupby(['Sex', 'Age_cat'])['Survived'].count().unstack('Age_cat'), 2)
```

Out[25]:

Age_cat	<10	<20	<30	<40	<50	<60	<70	<80	<90
Sex									
female	0.63	0.76	0.72	0.83	0.69	0.89	1.00	NaN	NaN
male	0.59	0.12	0.17	0.21	0.21	0.13	0.13	0.0	1.0

In []:

```
!apt-get install texlive texlive-xetex texlive-latex-extra pandoc  
!pip install pypandoc
```

Reading package lists... Done
 Building dependency tree
 Reading state information... Done
 pandoc is already the newest version (1.19.2.4~dfsg-1build4).
 pandoc set to manually installed.
 The following package was automatically installed and is no longer required:

libnvidia-common-460

Use 'apt autoremove' to remove it.

The following additional packages will be installed:

fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono fonts-texgyre
 javascript-common libcupsfilters1 libcupsimage2 libgs9 libgs9-common
 libijs-0.35 libjbig2dec0 libjs-jquery libkpathsea6 libpotrace0 libptexenc1
 libruby2.5 libsyntaxtex1 libtexlua52 libtexlua52 libzzip-0-13 lmodern
 poppler-data preview-latex-style rake ruby ruby-did-you-mean ruby-minitest
 ruby-net-telnet ruby-power-assert ruby-test-unit ruby2.5
 rubygems-integration t1utils tex-common tex-gyre texlive-base
 texlive-binaries texlive-fonts-recommended texlive-latex-base
 texlive-latex-recommended texlive-pictures texlive-plain-generic tipa

Suggested packages:

fonts-noto apache2 | lighttpd | httpd poppler-utils ghostscript
 fonts-japanese-mincho | fonts-ipafont-mincho fonts-japanese-gothic
 | fonts-ipafont-gothic fonts-arphic-ukai fonts-arphic-uming fonts-nanum ri
 ruby-dev bundler debhelper gv | postscript-viewer perl-tk xpdf-reader
 | pdf-viewer texlive-fonts-recommended-doc texlive-latex-base-doc
 python-pygments icc-profiles libfile-which-perl
 libspreadsheet-parseexcel-perl texlive-latex-extra-doc
 texlive-latex-recommended-doc texlive-pstricks dot2tex prerex ruby-tcltk
 | libtcltk-ruby texlive-pictures-doc vprerex

The following NEW packages will be installed:

fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono fonts-texgyre
 javascript-common libcupsfilters1 libcupsimage2 libgs9 libgs9-common
 libijs-0.35 libjbig2dec0 libjs-jquery libkpathsea6 libpotrace0 libptexenc1
 libruby2.5 libsyntaxtex1 libtexlua52 libtexlua52 libzzip-0-13 lmodern
 poppler-data preview-latex-style rake ruby ruby-did-you-mean ruby-minitest
 ruby-net-telnet ruby-power-assert ruby-test-unit ruby2.5
 rubygems-integration t1utils tex-common tex-gyre texlive texlive-base
 texlive-binaries texlive-fonts-recommended texlive-latex-base
 texlive-latex-extra texlive-latex-recommended texlive-pictures
 texlive-plain-generic texlive-xetex tipa

0 upgraded, 47 newly installed, 0 to remove and 20 not upgraded.

Need to get 146 MB of archives.

After this operation, 460 MB of additional disk space will be used.

Get:1 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 fonts-droid-fallback all 1:6.0.1r16-1.1 [1,805 kB]

Get:2 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 fonts-lato all 2.0-2 [2,698 kB]

Get:3 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 poppler-data all 0.4.8-2 [1,479 kB]

Get:4 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 tex-common all 6.09 [33.0 kB]

Get:5 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 fonts-lmodern all 2.004.5-3 [4,551 kB]

Get:6 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 fonts-noto-mono all 20171026-2 [75.5 kB]

Get:7 <http://archive.ubuntu.com/ubuntu> bionic/universe amd64 fonts-texgyre all 20160520-1 [8,761 kB]

Get:8 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 javascript-common all 11 [6,066 B]

Get:9 <http://archive.ubuntu.com/ubuntu> bionic-updates/main amd64 libcupsfilters1 amd64 1.20.2-0ubuntu3.1 [108 kB]

Get:10 <http://archive.ubuntu.com/ubuntu> bionic-updates/main amd64 libcupsimage2 am

d64 2.2.7-1ubuntu2.9 [18.6 kB]
Get:11 http://archive.ubuntu.com/ubuntu bionic/main amd64 libijs-0.35 amd64 0.35-13 [15.5 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic/main amd64 libjbig2dec0 amd64 0.13-6 [55.9 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libgs9-common all 9.26~dfsg+0-0ubuntu0.18.04.16 [5,093 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libgs9 amd64 9.26~dfsg+0-0ubuntu0.18.04.16 [2,265 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic/main amd64 libjs-jquery all 3.2.1-1 [152 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libkpathsea6 amd64 2017.20170613.44572-8ubuntu0.1 [54.9 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic/main amd64 libpotrace0 amd64 1.14-2 [17.4 kB]
Get:18 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libptexenc1 amd64 2017.20170613.44572-8ubuntu0.1 [34.5 kB]
Get:19 http://archive.ubuntu.com/ubuntu bionic/main amd64 rubygems-integration all 1.11 [4,994 B]
Get:20 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 ruby2.5 amd64 2.5.1-1ubuntu1.12 [48.6 kB]
Get:21 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby amd64 1:2.5.1 [5,712 B]
Get:22 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 rake all 12.3.1-1ubuntu0.1 [44.9 kB]
Get:23 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-did-you-mean all 1.2.0-2 [9,700 B]
Get:24 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-minitest all 5.10.3-1 [38.6 kB]
Get:25 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-net-telnet all 0.1.1-2 [12.6 kB]
Get:26 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-power-assert all 0.3.0-1 [7,952 B]
Get:27 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-test-unit all 3.2.5-1 [61.1 kB]
Get:28 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libruby2.5 amd64 2.5.1-1ubuntu1.12 [3,073 kB]
Get:29 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libsynchronet1 amd64 2017.20170613.44572-8ubuntu0.1 [41.4 kB]
Get:30 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtexlua52 amd64 2017.20170613.44572-8ubuntu0.1 [91.2 kB]
Get:31 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtexluajit2 amd64 2017.20170613.44572-8ubuntu0.1 [230 kB]
Get:32 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libzip-0-13 amd64 0.13.62-3.1ubuntu0.18.04.1 [26.0 kB]
Get:33 http://archive.ubuntu.com/ubuntu bionic/main amd64 lmodern all 2.004.5-3 [9,631 kB]
Get:34 http://archive.ubuntu.com/ubuntu bionic/main amd64 preview-latex-style all 11.91-1ubuntu1 [185 kB]
Get:35 http://archive.ubuntu.com/ubuntu bionic/main amd64 t1utils amd64 1.41-2 [56.0 kB]
Get:36 http://archive.ubuntu.com/ubuntu bionic/universe amd64 tex-gyre all 20160520-1 [4,998 kB]
Get:37 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 texlive-binaries amd64 2017.20170613.44572-8ubuntu0.1 [8,179 kB]
Get:38 http://archive.ubuntu.com/ubuntu bionic/main amd64 texlive-base all 2017.20180305-1 [18.7 MB]
Get:39 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-fonts-recommended all 2017.20180305-1 [5,262 kB]
Get:40 http://archive.ubuntu.com/ubuntu bionic/main amd64 texlive-latex-base all 2017.20180305-1 [951 kB]

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Get:41 http://archive.ubuntu.com/ubuntu bionic/main amd64 texlive-latex-recommende
d all 2017.20180305-1 [14.9 MB]
Get:42 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive all 2017.201
80305-1 [14.4 kB]
Get:43 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-pictures all
2017.20180305-1 [4,026 kB]
Get:44 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-latex-extra
all 2017.20180305-2 [10.6 MB]
Get:45 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-plain-generi
c all 2017.20180305-2 [23.6 MB]
Get:46 http://archive.ubuntu.com/ubuntu bionic/universe amd64 tipa all 2:1.3-20
[2,978 kB]
Get:47 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-xetex all 20
17.20180305-1 [10.7 MB]
Fetched 146 MB in 5s (32.0 MB/s)
Extracting templates from packages: 100%
Preconfiguring packages ...
Selecting previously unselected package fonts-droid-fallback.
(Reading database ... 155685 files and directories currently installed.)
Preparing to unpack .../00-fonts-droid-fallback_1%3a6.0.1r16-1.1_all.deb ...
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1) ...
Selecting previously unselected package fonts-lato.
Preparing to unpack .../01-fonts-lato_2.0-2_all.deb ...
Unpacking fonts-lato (2.0-2) ...
Selecting previously unselected package poppler-data.
Preparing to unpack .../02-poppler-data_0.4.8-2_all.deb ...
Unpacking poppler-data (0.4.8-2) ...
Selecting previously unselected package tex-common.
Preparing to unpack .../03-tex-common_6.09_all.deb ...
Unpacking tex-common (6.09) ...
Selecting previously unselected package fonts-lmodern.
Preparing to unpack .../04-fonts-lmodern_2.004.5-3_all.deb ...
Unpacking fonts-lmodern (2.004.5-3) ...
Selecting previously unselected package fonts-noto-mono.
Preparing to unpack .../05-fonts-noto-mono_20171026-2_all.deb ...
Unpacking fonts-noto-mono (20171026-2) ...
Selecting previously unselected package fonts-texgyre.
Preparing to unpack .../06-fonts-texgyre_20160520-1_all.deb ...
Unpacking fonts-texgyre (20160520-1) ...
Selecting previously unselected package javascript-common.
Preparing to unpack .../07-javascript-common_11_all.deb ...
Unpacking javascript-common (11) ...
Selecting previously unselected package libcupsfilters1:amd64.
Preparing to unpack .../08-libcupsfilters1_1.20.2-0ubuntu3.1_amd64.deb ...
Unpacking libcupsfilters1:amd64 (1.20.2-0ubuntu3.1) ...
Selecting previously unselected package libcupsimage2:amd64.
Preparing to unpack .../09-libcupsimage2_2.2.7-1ubuntu2.9_amd64.deb ...
Unpacking libcupsimage2:amd64 (2.2.7-1ubuntu2.9) ...
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack .../10-libijs-0.35_0.35-13_amd64.deb ...
Unpacking libijs-0.35:amd64 (0.35-13) ...
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack .../11-libjbig2dec0_0.13-6_amd64.deb ...
Unpacking libjbig2dec0:amd64 (0.13-6) ...
Selecting previously unselected package libgs9-common.
Preparing to unpack .../12-libgs9-common_9.26~dfsg+0-0ubuntu0.18.04.16_all.deb ...
Unpacking libgs9-common (9.26~dfsg+0-0ubuntu0.18.04.16) ...
Selecting previously unselected package libgs9:amd64.
Preparing to unpack .../13-libgs9_9.26~dfsg+0-0ubuntu0.18.04.16_amd64.deb ...
Unpacking libgs9:amd64 (9.26~dfsg+0-0ubuntu0.18.04.16) ...
Selecting previously unselected package libjs-jquery.
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Preparing to unpack .../14-libjs-jquery_3.2.1-1_all.deb ...
Unpacking libjs-jquery (3.2.1-1) ...
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack .../15-libkpathsea6_2017.20170613.44572-8ubuntu0.1_amd64.deb
...
Unpacking libkpathsea6:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libpotrace0.
Preparing to unpack .../16-libpotrace0_1.14-2_amd64.deb ...
Unpacking libpotrace0 (1.14-2) ...
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack .../17-libptexenc1_2017.20170613.44572-8ubuntu0.1_amd64.deb
...
Unpacking libptexenc1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package rubygems-integration.
Preparing to unpack .../18-rubygems-integration_1.11_all.deb ...
Unpacking rubygems-integration (1.11) ...
Selecting previously unselected package ruby2.5.
Preparing to unpack .../19-ruby2.5_2.5.1-1ubuntu1.12_amd64.deb ...
Unpacking ruby2.5 (2.5.1-1ubuntu1.12) ...
Selecting previously unselected package ruby.
Preparing to unpack .../20-ruby_1%3a2.5.1_amd64.deb ...
Unpacking ruby (1:2.5.1) ...
Selecting previously unselected package rake.
Preparing to unpack .../21-rake_12.3.1-1ubuntu0.1_all.deb ...
Unpacking rake (12.3.1-1ubuntu0.1) ...
Selecting previously unselected package ruby-did-you-mean.
Preparing to unpack .../22-ruby-did-you-mean_1.2.0-2_all.deb ...
Unpacking ruby-did-you-mean (1.2.0-2) ...
Selecting previously unselected package ruby-minitest.
Preparing to unpack .../23-ruby-minitest_5.10.3-1_all.deb ...
Unpacking ruby-minitest (5.10.3-1) ...
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack .../24-ruby-net-telnet_0.1.1-2_all.deb ...
Unpacking ruby-net-telnet (0.1.1-2) ...
Selecting previously unselected package ruby-power-assert.
Preparing to unpack .../25-ruby-power-assert_0.3.0-1_all.deb ...
Unpacking ruby-power-assert (0.3.0-1) ...
Selecting previously unselected package ruby-test-unit.
Preparing to unpack .../26-ruby-test-unit_3.2.5-1_all.deb ...
Unpacking ruby-test-unit (3.2.5-1) ...
Selecting previously unselected package libruby2.5:amd64.
Preparing to unpack .../27-libruby2.5_2.5.1-1ubuntu1.12_amd64.deb ...
Unpacking libruby2.5:amd64 (2.5.1-1ubuntu1.12) ...
Selecting previously unselected package libsyntax1:amd64.
Preparing to unpack .../28-libsyntax1_2017.20170613.44572-8ubuntu0.1_amd64.deb
...
Unpacking libsyntax1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libtexlua52:amd64.
Preparing to unpack .../29-libtexlua52_2017.20170613.44572-8ubuntu0.1_amd64.deb
...
Unpacking libtexlua52:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libtexluajit2:amd64.
Preparing to unpack .../30-libtexluajit2_2017.20170613.44572-8ubuntu0.1_amd64.deb
...
Unpacking libtexluajit2:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libzip-0-13:amd64.
Preparing to unpack .../31-libzip-0-13_0.13.62-3.1ubuntu0.18.04.1_amd64.deb ...
Unpacking libzip-0-13:amd64 (0.13.62-3.1ubuntu0.18.04.1) ...
Selecting previously unselected package lmodern.
Preparing to unpack .../32-lmodern_2.004.5-3_all.deb ...
Unpacking lmodern (2.004.5-3) ...
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Selecting previously unselected package preview-latex-style.
Preparing to unpack .../33-preview-latex-style_11.91-1ubuntu1_all.deb ...
Unpacking preview-latex-style (11.91-1ubuntu1) ...
Selecting previously unselected package t1utils.
Preparing to unpack .../34-t1utils_1.41-2_amd64.deb ...
Unpacking t1utils (1.41-2) ...
Selecting previously unselected package tex-gyre.
Preparing to unpack .../35-tex-gyre_20160520-1_all.deb ...
Unpacking tex-gyre (20160520-1) ...
Selecting previously unselected package texlive-binaries.
Preparing to unpack .../36-texlive-binaries_2017.20170613.44572-8ubuntu0.1_amd64.d
eb ...
Unpacking texlive-binaries (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package texlive-base.
Preparing to unpack .../37-texlive-base_2017.20180305-1_all.deb ...
Unpacking texlive-base (2017.20180305-1) ...
Selecting previously unselected package texlive-fonts-recommended.
Preparing to unpack .../38-texlive-fonts-recommended_2017.20180305-1_all.deb ...
Unpacking texlive-fonts-recommended (2017.20180305-1) ...
Selecting previously unselected package texlive-latex-base.
Preparing to unpack .../39-texlive-latex-base_2017.20180305-1_all.deb ...
Unpacking texlive-latex-base (2017.20180305-1) ...
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack .../40-texlive-latex-recommended_2017.20180305-1_all.deb ...
Unpacking texlive-latex-recommended (2017.20180305-1) ...
Selecting previously unselected package texlive.
Preparing to unpack .../41-texlive_2017.20180305-1_all.deb ...
Unpacking texlive (2017.20180305-1) ...
Selecting previously unselected package texlive-pictures.
Preparing to unpack .../42-texlive-pictures_2017.20180305-1_all.deb ...
Unpacking texlive-pictures (2017.20180305-1) ...
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack .../43-texlive-latex-extra_2017.20180305-2_all.deb ...
Unpacking texlive-latex-extra (2017.20180305-2) ...
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack .../44-texlive-plain-generic_2017.20180305-2_all.deb ...
Unpacking texlive-plain-generic (2017.20180305-2) ...
Selecting previously unselected package tipa.
Preparing to unpack .../45-tipa_2%3a1.3-20_all.deb ...
Unpacking tipa (2:1.3-20) ...
Selecting previously unselected package texlive-xetex.
Preparing to unpack .../46-texlive-xetex_2017.20180305-1_all.deb ...
Unpacking texlive-xetex (2017.20180305-1) ...
Setting up libgs9-common (9.26~dfsg+0-0ubuntu0.18.04.16) ...
Setting up libkpathsea6:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up libjs-jquery (3.2.1-1) ...
Setting up libtexlua52:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up fonts-droid-fallback (1:6.0.1r16-1.1) ...
Setting up libsynctex1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up libptexenc1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up tex-common (6.09) ...
update-language: texlive-base not installed and configured, doing nothing!
Setting up poppler-data (0.4.8-2) ...
Setting up tex-gyre (20160520-1) ...
Setting up preview-latex-style (11.91-1ubuntu1) ...
Setting up fonts-texgyre (20160520-1) ...
Setting up fonts-noto-mono (20171026-2) ...
Setting up fonts-lato (2.0-2) ...
Setting up libcupsfilters1:amd64 (1.20.2-0ubuntu3.1) ...
Setting up libcupsimage2:amd64 (2.2.7-1ubuntu2.9) ...
Setting up libjbig2dec0:amd64 (0.13-6) ...
```

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Setting up ruby-did-you-mean (1.2.0-2) ...
Setting up tlutils (1.41-2) ...
Setting up ruby-net-telnet (0.1.1-2) ...
Setting up libijs-0.35:amd64 (0.35-13) ...
Setting up rubygems-integration (1.11) ...
Setting up libpotrace0 (1.14-2) ...
Setting up javascript-common (11) ...
Setting up ruby-minitest (5.10.3-1) ...
Setting up libzip-0-13:amd64 (0.13.62-3.1ubuntu0.18.04.1) ...
Setting up libgs9:amd64 (9.26~dfsg+0-0ubuntu0.18.04.16) ...
Setting up libtexluajit2:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up fonts-lmodern (2.004.5-3) ...
Setting up ruby-power-assert (0.3.0-1) ...
Setting up texlive-binaries (2017.20170613.44572-8ubuntu0.1) ...
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin (xdvi.bi
n) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex (bi
btex) in auto mode
Setting up texlive-base (2017.20180305-1) ...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN...
mktexlsr: Updating /var/lib/texmf/ls-R...
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4: /var/lib/texmf/dvips/config/config-p
aper.ps
tl-paper: setting paper size for dvipdfmx to a4: /var/lib/texmf/dvipdfmx/dvipdfmx-
paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
tl-paper: setting paper size for pdftex to a4: /var/lib/texmf/tex/generic/config/p
dftexconfig.tex
Setting up texlive-fonts-recommended (2017.20180305-1) ...
Setting up texlive-plain-generic (2017.20180305-2) ...
Setting up texlive-latex-base (2017.20180305-1) ...
Setting up lmodern (2.004.5-3) ...
Setting up texlive-latex-recommended (2017.20180305-1) ...
Setting up texlive-pictures (2017.20180305-1) ...
Setting up tipa (2:1.3-20) ...
Regenerating '/var/lib/texmf/fmtutil.cnf-DEBIAN'... done.
Regenerating '/var/lib/texmf/fmtutil.cnf-TEXLIVEDIST'... done.
update-fmtutil has updated the following file(s):
    /var/lib/texmf/fmtutil.cnf-DEBIAN
    /var/lib/texmf/fmtutil.cnf-TEXLIVEDIST
If you want to activate the changes in the above file(s),
you should run fmtutil-sys or fmtutil.
Setting up texlive (2017.20180305-1) ...
Setting up texlive-latex-extra (2017.20180305-2) ...
Setting up texlive-xetex (2017.20180305-1) ...
Setting up ruby2.5 (2.5.1-1ubuntu1.12) ...
Setting up ruby (1:2.5.1) ...
Setting up ruby-test-unit (3.2.5-1) ...
Setting up rake (12.3.1-1ubuntu0.1) ...
Setting up libruby2.5:amd64 (2.5.1-1ubuntu1.12) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.5) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for fontconfig (2.12.6-0ubuntu2) ...
Processing triggers for tex-common (6.09) ...
Running updmap-sys. This may take some time... done.
Running mktexlsr /var/lib/texmf ... done.
Building format(s) --all.
    This may take some time...
```

In []:

```
#!cp '/content/gdrive/MyDrive/Colab Notebooks/swe3032_week2.ipynb'  
!jupyter nbconvert --to html '/content/gdrive/MyDrive/Colab Notebooks/swe3032_week2.ipynb'
```