

Lab3

June 16, 2020

```
[8]: import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
import seaborn as sns
sns.set()
```

```
[9]: from google.colab import drive
drive.mount("/content/drive")
```

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

```
[10]: df = pd.read_excel ('/content/drive/My Drive/ml_data/absent.xlsx')
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 740 entries, 0 to 739
```

```
Data columns (total 21 columns):
```

#	Column	Non-Null Count	Dtype
0	ID	740 non-null	int64
1	Reason for absence	740 non-null	int64
2	Month of absence	740 non-null	int64
3	Day of the week	740 non-null	int64
4	Seasons	740 non-null	int64
5	Transportation expense	740 non-null	int64
6	Distance from Residence to Work	740 non-null	int64
7	Service time	740 non-null	int64
8	Age	740 non-null	int64
9	Work load Average/day	740 non-null	int64
10	Hit target	740 non-null	int64
11	Disciplinary failure	740 non-null	int64
12	Education	740 non-null	int64
13	Son	740 non-null	int64
14	Social drinker	740 non-null	int64
15	Social smoker	740 non-null	int64
16	Pet	740 non-null	int64

```

17 Weight                740 non-null    int64
18 Height                740 non-null    int64
19 Body mass index       740 non-null    int64
20 Absenteeism time in hours 740 non-null    int64
dtypes: int64(21)
memory usage: 121.5 KB

```

```

[11]: print(df)
      print("Number of rows:"+str(df['ID'].count()))

```

	ID	Reason for absence	...	Body mass index	Absenteeism time in hours
0	11	26	...	30	4
1	36	0	...	31	0
2	3	23	...	31	2
3	7	7	...	24	4
4	11	23	...	30	2
..
735	11	14	...	30	8
736	1	11	...	29	4
737	4	0	...	34	0
738	8	0	...	35	0
739	35	0	...	25	0

```

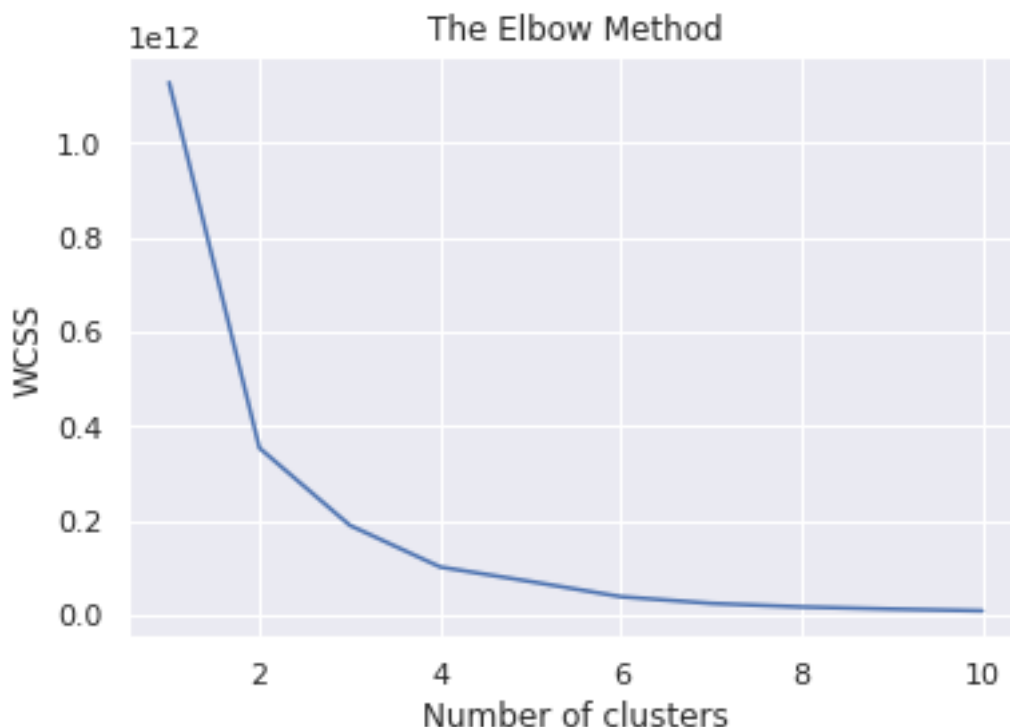
[740 rows x 21 columns]
Number of rows:740

```

```

[12]: from sklearn.cluster import KMeans
      wcss =[] #WCSS (within-cluster sums of squares) will necessarily maximize the
      ↳distance between clusters.
      for i in range (1,11):
          kmeans = KMeans(n_clusters = i, init = 'k-means++', max_iter =300, n_init =
          ↳10, random_state = 0)
          kmeans.fit(df)
          wcss.append(kmeans.inertia_)#(Inertia is the sum of squared error for each
          ↳cluster. Smaller the inertia, denser
      # Plot the graph to visualize the Elbow Method to find the optimal number of
      ↳cluster
      plt.plot(range(1,11),wcss)
      plt.title('The Elbow Method')
      plt.xlabel('Number of clusters')
      plt.ylabel('WCSS')
      plt.show()

```



[13]: *#Can be used to detect the principal components*

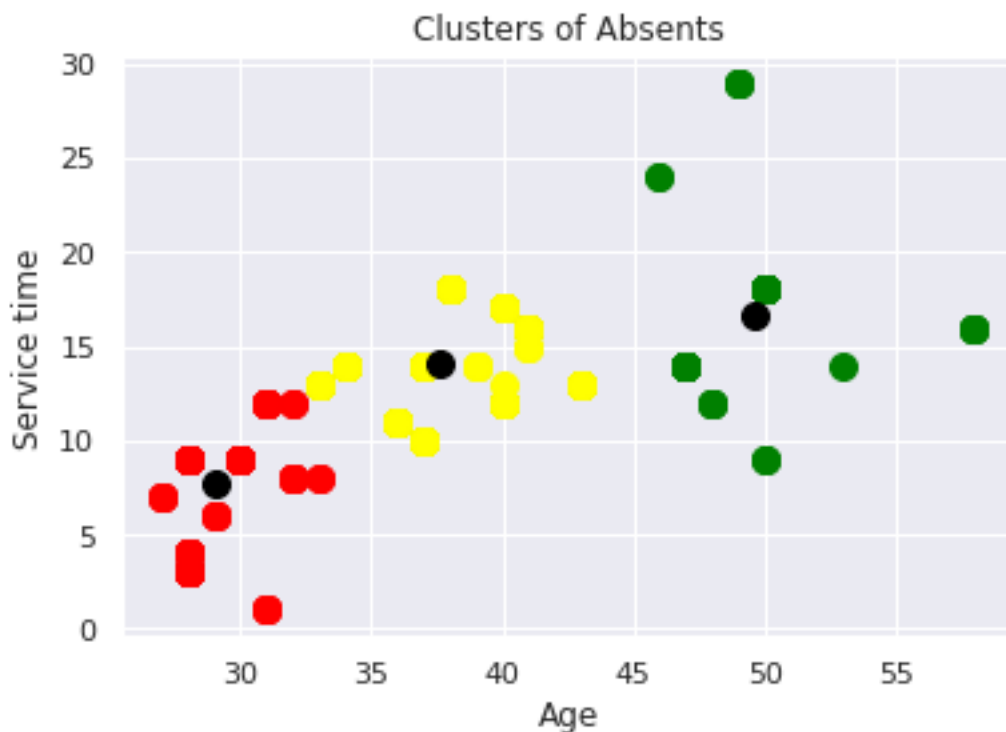
```
from sklearn.decomposition import PCA
pca = PCA(n_components=5)
pca.fit(df)
print(pca.explained_variance_ratio_)
df1=pca.fit_transform(df)
print(df1)
```

```
[9.99996471e-01 2.96324021e-06 1.70337899e-07 1.33205604e-07
 1.10228617e-07]
[[-3.19362352e+04  6.77457399e+01 -8.29911748e+00  8.19442931e+00
 -8.10816300e+00]
 [-3.19362350e+04 -1.05464841e+02  1.30684129e+01  1.34597099e+01
 -1.63828979e+01]
 [-3.19362368e+04 -4.06920479e+01 -2.99690620e+01  1.40534968e+00
 1.25490084e+00]
 ...
 [-2.71235887e+02 -1.03939761e+02 -4.75188305e+00  1.64988420e+01
 -1.28578155e+01]
 [-2.71235302e+02  9.56557616e+00 -1.43629262e+01  1.69582165e+01
 -1.27585969e+01]
 [-2.71234958e+02 -4.20072344e+01 -4.40808489e+00 -8.17176829e+00
 7.41536034e-01]]
```

```
[50]: df1=np.array(df[['Age','Service time']])
# print(df1)
# Applying KMeans to the dataset with the optimal number of cluster
kmeans=KMeans(n_clusters= 3, init = 'k-means++', max_iter = 1000, n_init = 10,
    →random_state = 0)
Y_Kmeans = kmeans.fit_predict(df1)

plt.scatter(df1[Y_Kmeans == 0, 0], df1[Y_Kmeans == 0,1],s = 100, c='yellow',
    →label = 'Cluster 1')
plt.scatter(df1[Y_Kmeans == 1, 0], df1[Y_Kmeans == 1,1],s = 100, c='green',
    →label = 'Cluster 2')
plt.scatter(df1[Y_Kmeans == 2, 0], df1[Y_Kmeans == 2,1],s = 100, c='red', label=
    →'Cluster 3')
plt.scatter(df1[Y_Kmeans == 3, 0], df1[Y_Kmeans == 3,1],s = 100, c='blue',
    →label = 'Cluster 4')

plt.scatter(kmeans.cluster_centers_[0,0], kmeans.cluster_centers_[0,1], s =
    →100, c = 'black', label = 'Centroids')
plt.title('Clusters of Absents')
plt.xlabel('Age')
plt.ylabel('Service time')
# plt.legend()
plt.show()
```



```
[37]: df1=np.array(df[['Service time','Distance from Residence to Work']])
# print(df1)
# Applying KMeans to the dataset with the optimal number of cluster
kmeans=KMeans(n_clusters= 3, init = 'k-means++', max_iter = 1000, n_init = 10,
    random_state = 0)
Y_Kmeans = kmeans.fit_predict(df1)

plt.scatter(df1[Y_Kmeans == 0, 0], df1[Y_Kmeans == 0,1],s = 100, c='yellow',
    label = 'Cluster 1')
plt.scatter(df1[Y_Kmeans == 1, 0], df1[Y_Kmeans == 1,1],s = 100, c='green',
    label = 'Cluster 2')
plt.scatter(df1[Y_Kmeans == 2, 0], df1[Y_Kmeans == 2,1],s = 100, c='red', label=
    'Cluster 3')
plt.scatter(df1[Y_Kmeans == 3, 0], df1[Y_Kmeans == 3,1],s = 100, c='blue',
    label = 'Cluster 4')

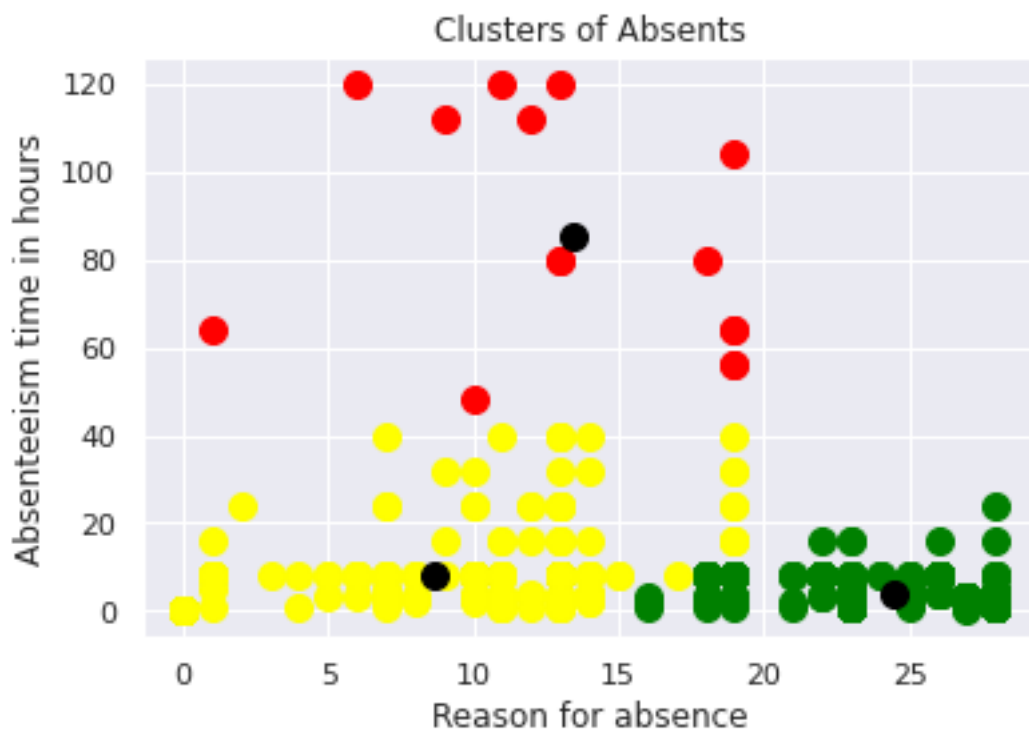
plt.scatter(kmeans.cluster_centers_[0,0], kmeans.cluster_centers_[0,1], s =
    100, c = 'black', label = 'Centroids')
plt.title('Clusters of Absents')
plt.xlabel('Service Time')
plt.ylabel('Distance from Residence to Work')
plt.legend()
plt.show()
```



```
[49]: df1=np.array(df[['Reason for absence','Absenteeism time in hours']])
# print(df1)
# Applying KMeans to the dataset with the optimal number of cluster
kmeans=KMeans(n_clusters= 3, init = 'k-means++', max_iter = 1000, n_init = 10,
    random_state = 0)
Y_Kmeans = kmeans.fit_predict(df1)

plt.scatter(df1[Y_Kmeans == 0, 0], df1[Y_Kmeans == 0,1],s = 100, c='yellow',
    label = 'Cluster 1')
plt.scatter(df1[Y_Kmeans == 1, 0], df1[Y_Kmeans == 1,1],s = 100, c='green',
    label = 'Cluster 2')
plt.scatter(df1[Y_Kmeans == 2, 0], df1[Y_Kmeans == 2,1],s = 100, c='red', label=
    'Cluster 3')
plt.scatter(df1[Y_Kmeans == 3, 0], df1[Y_Kmeans == 3,1],s = 100, c='blue',
    label = 'Cluster 4')

plt.scatter(kmeans.cluster_centers_[0,0], kmeans.cluster_centers_[0,1], s =
    100, c = 'black', label = 'Centroids')
plt.title('Clusters of Absents')
plt.xlabel('Reason for absence')
plt.ylabel('Absenteeism time in hours')
plt.legend()
plt.show()
```



```
[51]: !apt-get install texlive texlive-xetex texlive-latex-extra pandoc
      !pip install py pandoc
```

```
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-440
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 libsynchronex1 libtexlua52 libtexluajit2 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 libsynchronex1 libtexlua52 libtexluajit2 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 43 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
amd64 2.2.7-1ubuntu2.8 [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+0-0ubuntu0.18.04.12 [5,092 kB]
Get:14 <http://archive.ubuntu.com/ubuntu> bionic-updates/main amd64 libgs9 amd64
9.26~dfsg+0-0ubuntu0.18.04.12 [2,264 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
2.5.1-1ubuntu1.6 [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 2.5.1-1ubuntu1.6 [3,069 kB]
 Get:29 <http://archive.ubuntu.com/ubuntu> bionic-updates/main amd64 libsyntax
 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]
 Get:41 <http://archive.ubuntu.com/ubuntu> bionic/main amd64 texlive-latex-
 recommended all 2017.20180305-1 [14.9 MB]
 Get:42 <http://archive.ubuntu.com/ubuntu> bionic/universe amd64 texlive all
 2017.20180305-1 [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-
 generic 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
 2017.20180305-1 [10.7 MB]
 Fetched 146 MB in 2s (68.9 MB/s)
 Extracting templates from packages: 100%
 Preconfiguring packages ...
 Selecting previously unselected package fonts-droid-fallback.

```

(Reading database ... 144328 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_2.2.7-1ubuntu2.8_amd64.deb ...
Unpacking libcupsimage2:amd64 (2.2.7-1ubuntu2.8) ...
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+0-0ubuntu0.18.04.12_all.deb
...
Unpacking libgs9-common (9.26~dfsg+0-0ubuntu0.18.04.12) ...
Selecting previously unselected package libgs9:amd64.
Preparing to unpack .../13-libgs9_9.26~dfsg+0-0ubuntu0.18.04.12_amd64.deb ...
Unpacking libgs9:amd64 (9.26~dfsg+0-0ubuntu0.18.04.12) ...
Selecting previously unselected package libjs-jquery.
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_2.5.1-1ubuntu1.6_amd64.deb ...
Unpacking ruby2.5 (2.5.1-1ubuntu1.6) ...
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_2.5.1-1ubuntu1.6_amd64.deb ...
Unpacking libruby2.5:amd64 (2.5.1-1ubuntu1.6) ...
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-libtexluaajit2_2017.20170613.44572-8ubuntu0.1_amd64.deb ...
Unpacking libtexluaajit2: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) ...
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.deb ...
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 ...

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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+0-0ubuntu0.18.04.12) ...
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 (2.2.7-1ubuntu2.8) ...
Setting up libjbig2dec0:amd64 (0.13-6) ...
Setting up ruby-did-you-mean (1.2.0-2) ...
Setting up t1utils (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+0-0ubuntu0.18.04.12) ...
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.bin) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex
(bibtex) 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-paper.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/pdftexconfig.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 (2.5.1-1ubuntu1.6) ...
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 (2.5.1-1ubuntu1.6) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
/sbin/ldconfig.real: /usr/local/lib/python3.6/dist-
packages/ideep4py/lib/libmkldnn.so.0 is not a symbolic link

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... done.
Collecting pypandoc
  Downloading https://files.pythonhosted.org/packages/d6/b7/5050dc1769c8a93d3ec7
c4bd55be161991c94b8b235f88bf7c764449e708/pypandoc-1.5.tar.gz
Requirement already satisfied: setuptools in /usr/local/lib/python3.6/dist-
packages (from pypandoc) (47.1.1)
Requirement already satisfied: pip>=8.1.0 in /usr/local/lib/python3.6/dist-
packages (from pypandoc) (19.3.1)
Requirement already satisfied: wheel>=0.25.0 in /usr/local/lib/python3.6/dist-
packages (from pypandoc) (0.34.2)
Building wheels for collected packages: pypandoc

```

```
Building wheel for py pandoc (setup.py) ... done
Created wheel for py pandoc: filename=py pandoc-1.5-cp36-none-any.whl size=17037
sha256=f6578debb5d798758a389dfe84ea7025b3693e52a334f5cd0b90de552c65a56b
Stored in directory: /root/.cache/pip/wheels/bb/7d/d6/2f9af55e800d37e42e546106
bcbd36a86e24e725e303d17e04
Successfully built py pandoc
Installing collected packages: py pandoc
Successfully installed py pandoc-1.5
```

```
[52]: !jupyter nbconvert --to PDF "/content/drive/M DriColab Notebooks/Lab3.ipynb"
```

```
[NbConvertApp] WARNING | pattern u'/content/Colab Notebooks/Lab3.ipynb' matched
no files
This application is used to convert notebook files (*.ipynb) to various other
formats.
```

```
WARNING: THE COMMANDLINE INTERFACE MAY CHANGE IN FUTURE RELEASES.
```

```
Options
```

```
-----
```

```
Arguments that take values are actually convenience aliases to full
Configurables, whose aliases are listed on the help line. For more information
on full configurables, see '--help-all'.
```

```
--execute
```

```
    Execute the notebook prior to export.
```

```
--allow-errors
```

```
    Continue notebook execution even if one of the cells throws an error and
include the error message in the cell output (the default behaviour is to abort
conversion). This flag is only relevant if '--execute' was specified, too.
```

```
--no-input
```

```
    Exclude input cells and output prompts from converted document.
```

```
    This mode is ideal for generating code-free reports.
```

```
--stdout
```

```
    Write notebook output to stdout instead of files.
```

```
--stdin
```

```
    read a single notebook file from stdin. Write the resulting notebook with
default basename 'notebook.*'
```

```
--inplace
```

```
    Run nbconvert in place, overwriting the existing notebook (only
relevant when converting to notebook format)
```

```
-y
```

```
    Answer yes to any questions instead of prompting.
```

```
--clear-output
```

```
    Clear output of current file and save in place,
overwriting the existing notebook.
```

```

--debug
    set log level to logging.DEBUG (maximize logging output)
--no-prompt
    Exclude input and output prompts from converted document.
--generate-config
    generate default config file
--nbformat=<Enum> (NotebookExporter.nbformat_version)
    Default: 4
    Choices: [1, 2, 3, 4]
    The nbformat version to write. Use this to downgrade notebooks.
--output-dir=<Unicode> (FilesWriter.build_directory)
    Default: ''
    Directory to write output(s) to. Defaults to output to the directory of each
    notebook. To recover previous default behaviour (outputting to the current
    working directory) use . as the flag value.
--writer=<DottedObjectName> (NbConvertApp.writer_class)
    Default: 'FilesWriter'
    Writer class used to write the results of the conversion
--log-level=<Enum> (Application.log_level)
    Default: 30
    Choices: (0, 10, 20, 30, 40, 50, 'DEBUG', 'INFO', 'WARN', 'ERROR',
'CRITICAL')
    Set the log level by value or name.
--reveal-prefix=<Unicode> (SlidesExporter.reveal_url_prefix)
    Default: u''
    The URL prefix for reveal.js (version 3.x). This defaults to the reveal CDN,
    but can be any url pointing to a copy of reveal.js.
    For speaker notes to work, this must be a relative path to a local copy of
    reveal.js: e.g., "reveal.js".
    If a relative path is given, it must be a subdirectory of the current
    directory (from which the server is run).
    See the usage documentation
    (https://nbconvert.readthedocs.io/en/latest/usage.html#reveal-js-html-slideshow)
    for more details.
--to=<Unicode> (NbConvertApp.export_format)
    Default: 'html'
    The export format to be used, either one of the built-in formats
    ['asciidoc', 'custom', 'html', 'latex', 'markdown', 'notebook', 'pdf',
    'python', 'rst', 'script', 'slides'] or a dotted object name that represents
    the import path for an `Exporter` class
--template=<Unicode> (TemplateExporter.template_file)
    Default: u''
    Name of the template file to use
--output=<Unicode> (NbConvertApp.output_base)
    Default: ''
    overwrite base name use for output files. can only be used when converting
    one notebook at a time.
--post=<DottedOrNone> (NbConvertApp.postprocessor_class)

```



```
Default: u''
PostProcessor class used to write the results of the conversion
--config=<Unicode> (JupyterApp.config_file)
Default: u''
Full path of a config file.
```

To see all available configurables, use `--help-all`

Examples

The simplest way to use nbconvert is

```
> jupyter nbconvert mynotebook.ipynb
```

which will convert mynotebook.ipynb to the default format (probably HTML).

You can specify the export format with `--to`.

Options include ['asciidoc', 'custom', 'html', 'latex', 'markdown', 'notebook', 'pdf', 'python', 'rst', 'script', 'slides'].

```
> jupyter nbconvert --to latex mynotebook.ipynb
```

Both HTML and LaTeX support multiple output templates. LaTeX includes 'base', 'article' and 'report'. HTML includes 'basic' and 'full'. You can specify the flavor of the format used.

```
> jupyter nbconvert --to html --template basic mynotebook.ipynb
```

You can also pipe the output to stdout, rather than a file

```
> jupyter nbconvert mynotebook.ipynb --stdout
```

PDF is generated via latex

```
> jupyter nbconvert mynotebook.ipynb --to pdf
```

You can get (and serve) a Reveal.js-powered slideshow

```
> jupyter nbconvert myslides.ipynb --to slides --post serve
```

Multiple notebooks can be given at the command line in a couple of different ways:

```
> jupyter nbconvert notebook*.ipynb
> jupyter nbconvert notebook1.ipynb notebook2.ipynb
```

or you can specify the notebooks list in a config file, containing::

```
c.NbConvertApp.notebooks = ["my_notebook.ipynb"]  
> jupyter nbconvert --config mycfg.py
```