**4/17/24, 10:42 PM**

**from google.colab import drive drive.mount('/content/drive') pip install statsmodels**

**import numpy as np**

**import pandas as pd**

**import matplotlib.pyplot as plt**

**import statsmodels.api as** sm

**data =**

**data**

**pd.read\_csv("**/**content/drive/MyDrive/Colab Notebooks/**1.01**. Simple linear regression.csv")**

**data.describe()**

**plt.scatter(x1,y)**

**plt.xlabel(**'**SAT', fontsize =** 20) **plt.ylabel('GPA', fontsize**

**plt.show()**

**X = sm.add\_constant(x1)**

**results = sm.OLS(y,x).fit()**

**results.summary()**

**plt.scatter(x1,y)**

**yhat** = 0.0017**\*x1** + **0.275**

**x2 =**

**y2 =**

**fig**

=

**np.array(x1)**

**np.array(yhat)**

**plt.plot(x2,y2,lw**

**= 4, c =** '**orange**'**, label =** '**regression line')**

**plt.xlabel('SAT', fontsize 20**)

**plt.ylabel('GPA**'**, fontsize =** 20)

**plt.show()**

**import numpy as np**

**import pandas as pd**

**import matplotlib.pyplot as plt**

**import seaborn as sns**

**sns.set\_theme (style="darkgrid")**

**tips**

=

**sns.load\_dataset("tips")**

**sns.relplot(data=tips, x="total\_bill", y="tip")**

**<seaborn.axisgrid.FacetGrid at 0x7992c2701db0>**

10

tip

2

8

10

20

30 total\_bill

40

**sns.relplot(data-tips, x="total\_bill", y="tip", hue="smoker")**

50

50

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**3/18**

>

**>**

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**<seaborn.axisgrid.FacetGrid at 0x7992bfe91510>**

10

**22BAI1158.Lab3\_regression.ipynb - Colab**

tip

2

4

6

10

20

30

40

50

total bill

**sns.relplot(**

**data=tips,**

**x="total\_bill", y="tip", hue="smoker", style="smoker"**

tip

2

4

<**seaborn.axisgrid.FacetGrid at 0x7992c2a9a500>**

10

6

8

10

20

30

40

total\_bill

**sns.relplot(**

**data-tips,**

**x="total\_bill", y="tip", hue="smoker", style="time",**

x

59

50

X

smoker

Yes

其 No

smoker

Yes

No

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**4/18**

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992c01675b0>**

10

tip

6

4

2

X

其

xx

x

500

-

就

X

x x

3

X

**22BAI1158.Lab3\_regression.ipynb - Colab**

smoker

Yes

No

time

Lunch

X

\*

Dinner

10

20

30 total bill

40

50

**sns.relplot(**

**>**

**data=tips, x="total\_bill", y="tip", hue="size",**

**<seaborn.axisgrid.FacetGrid at 0x7992bff55a20>**

10

tip

**sns.relplot(**

**>**

8

6

4

2

**data=tips,**

10

20

30

40

50

59

total\_bill

**x="total\_bill", y="tip",**

hue**="size", palette="ch:r=-.5,1=.75"**

size

1

2

3

4

5

6

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

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**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992bff55300>**

10

**22BAI1158.Lab3\_regression.ipynb - Colab**

tip

2

4

6

8

10

20

30

40

total bill

**sns.relplot(data-tips, x="total\_bill", y="tip", size="size")**

**<seaborn.axisgrid.FacetGrid at 0x7992bfe910c0>**

10

tip

2

4

6

8

10

20

30

40

total\_bill

**sns.relplot(**

**data-tips, x="total\_bill", y="tip",**

**size="size", sizes=(15,** 200)

**>**

50

50

50

50

size

1

2

3

4

5

6

size

1

2 3 4 5 6

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

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**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992be45f3a0>**

10

**22BAI1158.Lab3\_regression.ipynb - Colab**

tip

2

st

4

6

8

10

20

30

40

total bill

**dowjones**

=

**sns.load\_dataset("dowjones")**

**sns.relplot(data=dowjones, x="Date", y="Price", kind="line")**

**<seaborn.axisgrid.FacetGrid at 0x7992be30e3b0**>

1000

Price

800

600

400

200

0

سا

1920 1930 1940 1950 1960 1970

Date

**fmri =**

**sns.load\_dataset("fmri")**

**sns.relplot(data=fmri, x="timepoint", y="signal", kind="line")**

50

50

size

1

2

3

4

5

6

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**7/18**

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992be1adb40>**

signal

0.15

0.10

0.05

0.00

-0.05

0.0 2.5 5.0

7.5

10.0 12.5 15.0 17.5

timepoint

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal", errorbar=None,**

>

<**seaborn.axisgrid.FacetGrid at 0x7992be2023e0>**

signal

0.125

0.100

0.075

0.050

0.025

0.000

-0.025

-0.050

0.0 2.5 5.0 7.5 10.0 12.5 15.0 17.5

timepoint

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal", errorbar="sd",**

>

**22BAI1158.Lab3\_regression.ipynb - Colab**

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**8/18**

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992be30f9d0>**

signal

0.25

0.20

0.15

0.10

0.05

0.00

-0.05

-0.10

0.0 2.5 5.0

7.5

10.0 12.5 15.0 17.5 timepoint

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal",**

**estimator=None,**

**>**

**<seaborn.axisgrid.FacetGrid at 0x7992be0ee7a0**>

0.6

signal

0.4

0.2

0.0

-0.2

0.0

2.5 5.0 7.5 10.0 12.5 15.0 17.5

timepoint

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal", hue="event",**

)

**22BAI1158.Lab3\_regression.ipynb - Colab**

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

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**4/17/24, 10:42** PM

**22BAI1158.Lab3\_regression.ipynb - Colab**

**<seaborn.axisgrid.FacetGrid at 0x7992c00272b0**>

**>**

signal

0.25

0.20

0.15

0.10

0.05

0.00

-0.05

A

-0.10

0.0 2.5

5.0

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal",**

**hue="region", style="event",**

7.5 10.0 12.5 15.0 17.5 timepoint

**<seaborn.axisgrid.FacetGrid at 0x7992be05f970>**

signal

0.3

0.2

0.1

0.0

-0.1

A

event

stim

cue

region parietal

frontal

event

stim

cue

**>**

0.0 2.5

5.0 7.5 10.0 12.5 15.0 17.5

timepoint

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal", hue="region", style="event",**

**dashes=False, markers=True,**

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**10/18**

>

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992be037850**>

signal

0.3

0.2

0.1

0.0

-0.1

0.0 2.5 5.0

7.5

10.0 12.5 15.0 17.5

timepoint

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal", hue="event", style="event",**

>

<**seaborn.axisgrid.FacetGrid at 0x7992bddaf5b0>**

signal

0.25

0.20

0.15

0.10

0.05

0.00

-0.05

-0.10

0.0 2.5 5.0 7.5 10.0 12.5 15.0 17.5

timepoint

**sns.relplot(**

**data=fmri.query("event**

==

**'stim'"), kind="line",**

**x="timepoint", y="signal", hue="region",**

**units="subject", estimator=None**,

**22BAI1158.Lab3\_regression.ipynb - Colab**

event

stim

cue

region parietal frontal

event

stim

cue

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

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**<seaborn.axisgrid.FacetGrid at 0x7992bdc6cf40>**

0.6

**22BAI1158.Lab3\_regression.ipynb - Colab**

signal

0.4

0.2

0.0

-0.2

0.0 2.5 5.0

10.0 12.5 15.0 17.5

7.5

timepoint

**dots** =

**sns.load\_dataset("dots").query("align**

**sns.relplot(**

>

**data=dots, kind="line",**

**x="time", y="firing\_rate",**

**hue="coherence", style="choice",**

==

**'dots'"**)

**<seaborn.axisgrid.FacetGrid at 0x7992bdd32ec0**>

60

firing\_rate

55

50

15

40

35

35

30

0

200

400

600

time

**palette**

=

**sns.cubehelix\_palette(light=.8, n\_colors=6)**

**sns.relplot(**

**data=dots, kind="line",**

**x="time", y="firing\_rate",**

**hue="coherence", style="choice", palette-palette,**

**>**

region

parietal frontal

coherence

0.0

3.2

6.4

12.8

25.6

51.2

choice

T1

T2

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

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**<seaborn.axisgrid.FacetGrid at 0x7992bde03e20>**

60

55

50

N

**22BAI1158.Lab3\_regression.ipynb - Colab**

coherence

firing\_rate

45

40

35

30

30

0

200

400

600

time

**from matplotlib.colors import LogNorm**

**palette**

=

**sns.cubehelix\_palette** (**light=.7, n\_colors=6)**

**sns.relplot(**

**data=dots.query(**"**coherence** > 0"**), kind="line",**

**x="time", y="firing\_rate",**

**hue="coherence", style="choice",**

**hue\_norm=LogNorm()**,

**>**

<**seaborn.axisgrid.FacetGrid at 0x7992be05f1c0>**

60

firing\_rate

55

50

50

45

55

40

35

335

30

**sns.relplot(**

**>**

0

200

400

600

time

**data=dots, kind="line",**

**x="time", y="firing\_rate",**

**size="coherence", style="choice",**

0.0

3.2

6.4

12.8

25.6

51.2

choice

T1

T2

coherence

3.2

6.4

12.8

25.6

51.2

choice

T1

T2

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**13/18**

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992bd9ea350>**

60

firing\_rate

55

50

45

40

35

30

30

**sns.relplot(**

**>**

0

200

400

600

time

**data=dots, kind="line",**

**x="time", y="firing\_rate",**

**hue="coherence", size="choice", palette=palette,**

**<seaborn.axisgrid.FacetGrid at 0x7992bd7bb580>**

60

firing\_rate

55

50

45

40

35

30

30

0

200

400

600

time

**healthexp**

=

**sns.relplot(**

**sns.load\_dataset("healthexp").sort\_values("Year")**

**data-healthexp, kind="line",**

**x="Spending\_USD", y="Life\_Expectancy", hue="Country",**

**sort=False**

**22BAI1158.Lab3\_regression.ipynb - Colab**

choice

T1

T2

coherence

0.0

3.2

6.4

12.8

25.6

51.2

coherence

0.0

3.2

6.4

12.8

25.6.

51.2

choice

T1

T2

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**14/18**

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992bd69f700>**

Life Expectancy

84

82

32

80

78

76

74

72

70

0

**22BAI1158.Lab3\_regression.ipynb - Colab**

2000 4000 6000 8000 10000 12000

Spending\_USD

**sns.relplot(**

**data=fmri, kind="line",**

**x="signal", y="timepoint", hue="event",**

**orient="y**",

**>**

<**seaborn.axisgrid.FacetGrid at 0x7992bd69f6a0>**

17.5

timepoint

15.0

12.5

10.0

7.5

75

5.0

2.5

0.0

-0.1

0.0

0.1

0.2

signal

**sns.relplot(**

**data=tips,**

**x="total\_bill", y="tip", hue="smoker", col="time",**

>

Country

Germany

France

Great Britain

Japan

USA

Canada

event

stim

cue

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**15/18**

**4/17/24, 10:42** PM

**<seaborn.axisgrid.FacetGrid at 0x7992bd5f7fd0>**

tip

2

4

6

10

00

8

time

=

Lunch

**22BAI1158.Lab3\_regression.ipynb - Colab**

time Dinner

10

20

30 total bill

40

50

10

20

30 total bill

40

**sns.relplot(**

**data=fmri, kind="line",**

**x="timepoint", y="signal", hue="subject",**

**col="region", row="event", height=3,**

**estimator=None**

**>**

**<seaborn.axisgrid.FacetGrid at 0x7992bd4fb790**>

signal

0.6

0.4

0.2

0.0

-0.2

0.6

event = stim | region = parietaevent = stim | region = frontal

A A

subject

s13

$5

s12

s11

s10

$9

=

event cue | region = parietalevent = cue | region = frontal\_

s8

s7

s6

signal

0.4

0.2

0.0

-0.2

0

5

10

15

0

5

10

15

timepoint

timepoint

**sns.relplot(**

**data=fmri.query("region**

==

**'frontal'"), kind="line",**

**x="timepoint", y="signal", hue="event", style="event",**

**col="subject", col\_wrap=5,**

**height=3, aspect=.75, linewidth=2.5,**

>

sl

s0

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

59

50

**16/18**

smoker

Yes

No

**4/17/24, 10:42** PM

signal

signal

**<seaborn.axisgrid.FacetGrid at 0x7992bd181780**>

0.4

0.3

0.2

0.1

0.0

-0.1

subject = s0

**22BAI1158.Lab3\_regression.ipynb - Colab**

subject = s2

subject = s10

subject = s11

subject = 53

Ат

A

subject = s4

subject = s5

subject = s6

subject = s7

subject = 58

0.4

0.3

0.2

0.1

0.0

-0.1

A

А

subject = s9

subject = $12

0.4

0.3

0.2

0.1

0.0

-0.1

Ą

subject = s13

A

subject = s1

АА

0 5 10 15 0 5 10 15 0 5 10

timepoint

timepoint

timepoint

15 0 5 10 15

timepoint

signal

**data** =

**pd.read\_csv("/content/drive/MyDrive/Colab Notebooks/parenthood.csv")**

**data**

**ID dan.sleep baby.sleep dan.grump day**

**0**

1

**7.59**

**10.18**

**56**

**1**

**1**

2

**7.91**

11.66

8

**60**

**2**

2

**3**

**5.14**

**7.92**

**82**

**3**

**3**

**4**

7.71

**9.61**

4 5

**6.68**

**9.75**

**67**

935

**55**

LO

**5**

**95**

**96**

**97**

98

8898

**96**

**5.31**

**5.89**

**79** 96

**97**

*7.77*

**9.77**

**51**

**5.38**

**6.97**

**82**

**99**

**7.02**

**6.56**

555

8898

**97**

**99**

99 **100**

**6.45**

**7.93**

**74 100**

**100 rows** x 5 **columns**

0 5

10 15

timepoint

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**17/18**

event

stim

cue

dad grumpiness

70

80

80

**4/17/24, 10:42** PM

**import numpy as np**

**import matplotlib.pyplot as plt**

**import ipywidgets as widgets**

**from IPython.display import display**

**ph\_df =**

**})**

**pd.DataFrame({**

**'dadsleep**'**: data['dan.sleep'],** '**dadgrump**'

**data[**'**dan.grump**'**]**

**22BAI1158.Lab3\_regression.ipynb - Colab**

**@widgets.interact(slope=widgets.IntSlider (min=-20, max=20, step-1, value**=**0**)**, intercept=widgets. IntSlider (min=0**, **max=200, step=1, value=50)) def plot\_grumpiness (slope, intercept):**

**predict resid**

=

**intercept+slope\*ph\_df.dadsleep**

**ph\_df.dadgrump-predict**

=

**fig, ax = plt.subplots(figsize=(9,6))**

**x1** =

**y1**

**np.linspace(ph\_df.dadsleep.min(), ph\_df.dadsleep.max()**,400)

=

**intercept+slope\*x1**

**ax.plot(ph\_df.dadsleep, ph\_df.dadgrump,** '**ko', markersize=4)**

**ax.plot(ph\_df.dadsleep, ph\_df.dadgrump-resid, 'o**'**, markersize=4, markeredgecolor=**'**r', markeredgewidth=.4, markerfacecolor=**'**white')**

**ax.plot(x1,y1,'**-**', color='steelblue', linewidth=1)**

**plt.xlabel("dad sleep")**

**plt.ylabel("dad grumpiness")**

**ax.vlines(ph\_df.dadsleep, ph\_df.dadgrump, ph\_df.dadgrump-resid,** '**r',linewidth=0.5)**

**plt.show()**

90

slope

**-3**

**intercept**

**90**

**https://colab.research.google.com/drive/1xUKKQz13zo2JSxOoqrHzSkOF107ZufBi#scrollTo=0F9Zj80w80wy&printMode=true**

**18/18**