FOUNDATION LESSON

WEEK 5 · LESSON 7

Analytical questions and Matplotlib objects

The Figure is the whole canvas; an Axes is a plotting area on that canvas.

THE MENTAL MODEL

MENTAL MODEL

The mental model

The Figure is the whole canvas; an Axes is a plotting area on that canvas.

ONE CANVAS AND ONE AXES

CODE WALKTHROUGH W05-L07-S03

```
01  import matplotlib
02  matplotlib.use("Agg")
03  import matplotlib.pyplot as plt
04  plt.rcParams.update({"font.size": 16})
05  fig, ax = plt.subplots(figsize=(12, 6.75))
06  ax.bar(["A", "B", "C"], [100, 150, 80])
07  ax.set(title="Branch revenue · January",
08         xlabel="Branch", ylabel="Revenue (EUR)")
09  fig.tight_layout()
10  fig.savefig("figure.png", dpi=320)
11  plt.close(fig)
12  print("Saved figure.png: 3840 x 2160")
```

WHAT TO TRACK

One canvas and one axes

PREDICT THE RESULT

Predict the output.
Explain each operation.
Pause before continuing.

ONE CANVAS AND ONE AXES · RESULT

CODE WALKTHROUGH W05-L07-S04

```
01 import matplotlib
02 matplotlib.use("Agg")
03 import matplotlib.pyplot as plt
04 plt.rcParams.update({"font.size": 16})
05 fig, ax = plt.subplots(figsize=(12, 6.75))
06 ax.bar(["A", "B", "C"], [100, 150, 80])
07 ax.set(title="Branch revenue · January",
08        xlabel="Branch", ylabel="Revenue (EUR)")
09 fig.tight_layout()
10 fig.savefig("figure.png", dpi=320)
11 plt.close(fig)
12 print("Saved figure.png: 3840 x 2160")
```

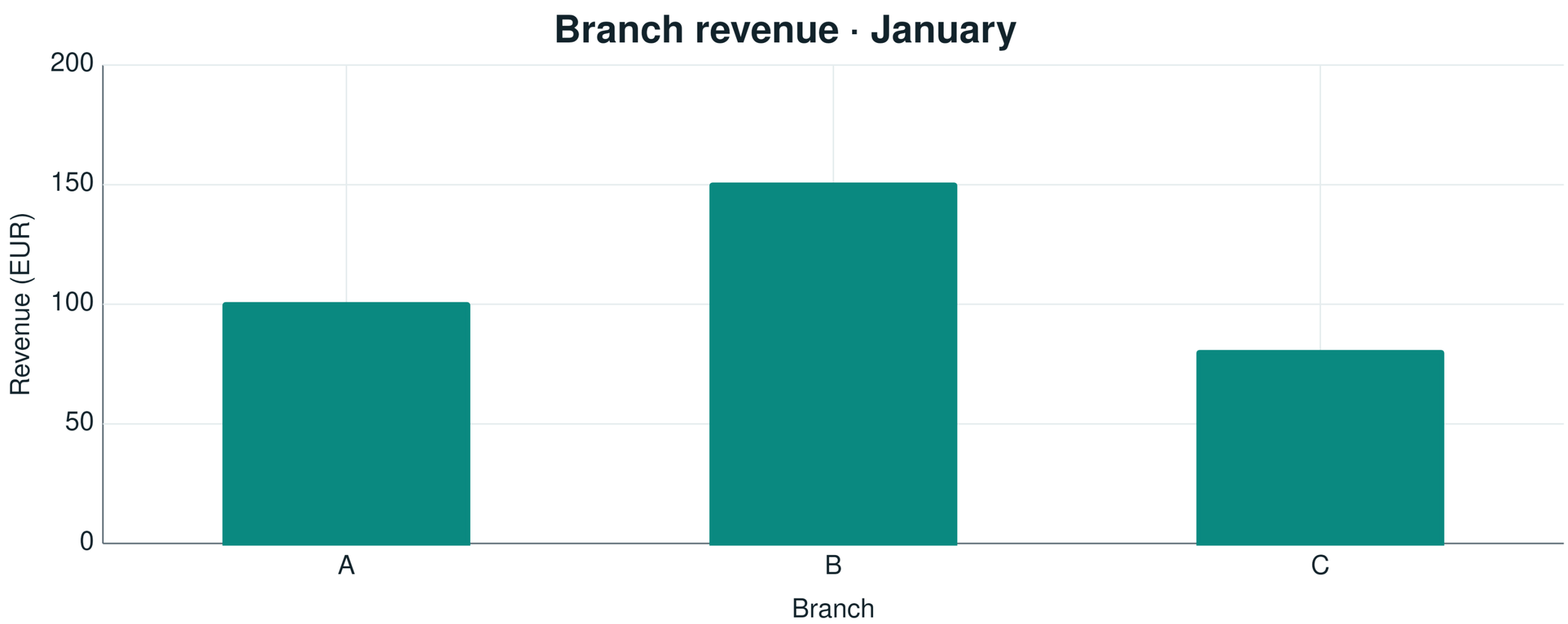
WHAT TO TRACK

One canvas and one axes

VALIDATE THE RESULT

```
Saved figure.png: 3840 x
2160
```

VISIBLE CHART RESULT



THE QUESTION DETERMINES THE MEASURE

CODE WALKTHROUGH W05-L07-S06

```
01  revenue = {"A": 100, "B": 150, "C": 80}
02  winner = max(revenue, key=revenue.get)
03  print("Largest revenue:", winner)
04  print("Coverage:", len(revenue), "branches, January")
```

WHAT TO TRACK

The question determines the measure

PREDICT THE RESULT

Predict the output.
Explain each operation.
Pause before continuing.

THE QUESTION DETERMINES THE MEASURE · RESULT

CODE WALKTHROUGH W05-L07-S07

```
01  revenue = {"A": 100, "B": 150, "C": 80}
02  winner = max(revenue, key=revenue.get)
03  print("Largest revenue:", winner)
04  print("Coverage:", len(revenue), "branches, January")
```

WHAT TO TRACK

The question determines the measure

VALIDATE THE RESULT

```
Largest revenue: B
Coverage: 3 branches,
January
```

MISMATCHED PLOT INPUTS

CODE WALKTHROUGH W05-L07-S08

```
01  import matplotlib
02  matplotlib.use("Agg")
03  import matplotlib.pyplot as plt
04  plt.rcParams.update({"font.size": 16})
05  fig, ax = plt.subplots()
06  ax.bar(["A", "B"], [100, 150, 80])
```

WHAT TO TRACK

Mismatched plot inputs

PREDICT THE RESULT

Predict the output.
Explain each operation.
Pause before continuing.

MISMATCHED PLOT INPUTS · RESULT

CODE WALKTHROUGH W05-L07-S09

```
01  import matplotlib
02  matplotlib.use("Agg")
03  import matplotlib.pyplot as plt
04  plt.rcParams.update({"font.size": 16})
05  fig, ax = plt.subplots()
06  ax.bar(["A", "B"], [100, 150, 80])
```

WHAT TO TRACK

Mismatched plot inputs

VALIDATE THE RESULT

```
ValueError: shape mismatch:
objects cannot be broadcast
to a single shape.  Mismatch
is between arg 0 with shape
(2,) and arg 1 with shape
(3,).
```

GUIDED PRACTICE

LEARNER PRACTICE

Guided practice

Create a bar chart for branches X and Y with revenue 40 and 60 EUR. Label both axes and the period.

PREDICT · MODIFY · RUN

01 Restate the supplied rules.

02 Predict the result.

03 Modify and run the code.

04 Compare actual output.

05 Explain any difference.

INDEPENDENT PRACTICE

LEARNER PRACTICE

Independent practice

State a question about units sold, then draw three products with 2, 5 and 3 units. Keep revenue out of the axis label.

PREDICT · MODIFY · RUN

01 Restate the supplied rules.

02 Predict the result.

03 Modify and run the code.

04 Compare actual output.

05 Explain any difference.

CHECK YOUR UNDERSTANDING

MENTAL MODEL

Check your understanding

Diagnostic: Does a larger revenue bar establish higher profit? No. Profit also requires a stated cost measure.

RECAP AND NEXT STEP

Recap and next step

Write the analytical question before plotting. Use fig for the canvas, ax for the plot, and explicit labels for period and units.

UNDERSTAND APPLY VALIDATE EXPLAIN