Lecture 2: Bar Plots in LaTeX

Your Name

Bar Plots in LaTeX

In this lecture, we learn to create bar charts and understand important styling parameters in PGFPlots.

What is a Bar Plot?

A bar plot displays data as rectangular bars where the height or length of the bar represents its value. It is best used for categorical comparison.

Why Use Bar Plots?

- Compare values across different categories
- Easy to visualize differences
- Good for discrete data (Non-continuous)
- Very common in business, surveys, research reporting

When NOT to Use Bar Plots

- When data is continuous (line plot is better)
- When exact values matter more than visual comparison

Things That Always Stay the Same

- `ybar` or `xbar` → type of bar chart
- `tikzpicture` → drawing area
- `axis` → creates axes/grid
- Coordinates define bars: `(Category, Value)`

Things That Can Change

- Vertical (ybar) or Horizontal (xbar)
- Bar width (thickness)
- Colors of bars
- Grouped vs Stacked bars
- Custom category labels
- Legend placement and styling

1) Simple Vertical Bar Chart

Code:

```
\begin{figure}[H]
\centering
\begin{tikzpicture}
\begin{axis}[
    ybar,
    xlabel={Categories},
    ylabel={Value},
    symbolic x coords={A,B,C},
    xtick=data
]
\addplot coordinates {(A,3) (B,5) (C,2)};
\end{axis}
\end{tikzpicture}
\caption{Simple Vertical Bar Chart}
\end{figure}
```

Output Code (copy to compile):

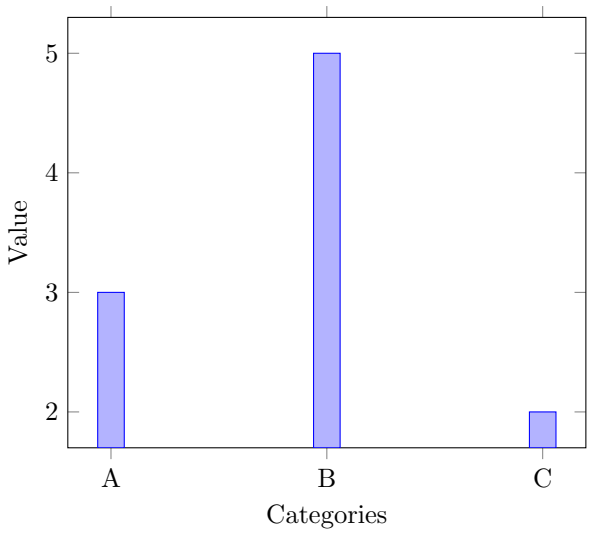

Figure 1: Simple Vertical Bar Chart

Key Parameters: - `ybar` → draw vertical bars - `symbolic x coords` → custom labels on X-axis - `xtick=data` → ticks under bars

—

2) Horizontal Bar Chart

```
\begin{figure}[H]
\centering
\begin{tikzpicture}
\begin{axis}[
    xbar,
    xlabel={Value},
    symbolic y coords={Red,Green,Blue},
    ytick=data
]
\addplot coordinates {(4,Red) (2,Green) (5,Blue)};
\end{axis}
\end{tikzpicture}
\caption{Horizontal Bar Chart}
\end{figure}
```

Output Code (copy to compile):

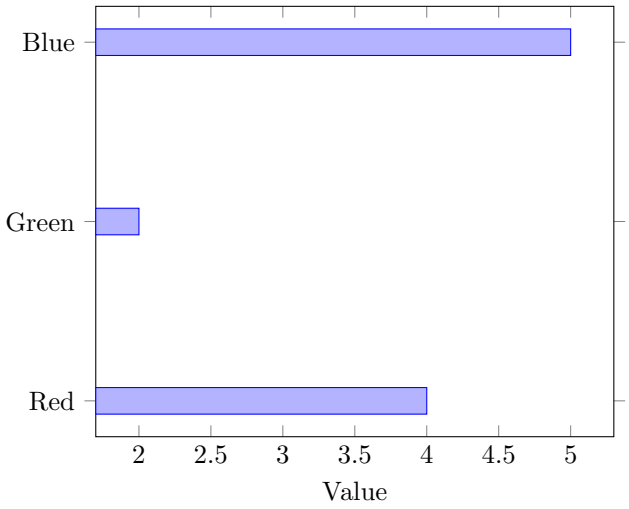

Figure 2: Horizontal Bar Chart

Key Parameters: - `xbar` → horizontal bars - `ytick=data` → ticks shown beside bars

—

3) Grouped Bar Chart

```
\begin{figure}[H]
\centering
\begin{tikzpicture}
\begin{axis}[
    ybar,
    bar width=12pt,
    symbolic x coords={2019,2020,2021},
    xtick=data,
    legend pos=north west
]
\addplot coordinates {(2019,10) (2020,12) (2021,14)};
\addplot coordinates {(2019,8) (2020,11) (2021,13)};
\legend{Product A, Product B}
\end{axis}
\end{tikzpicture}
\caption{Grouped Bar Chart}
\end{figure}
```

Output Code (copy to compile):

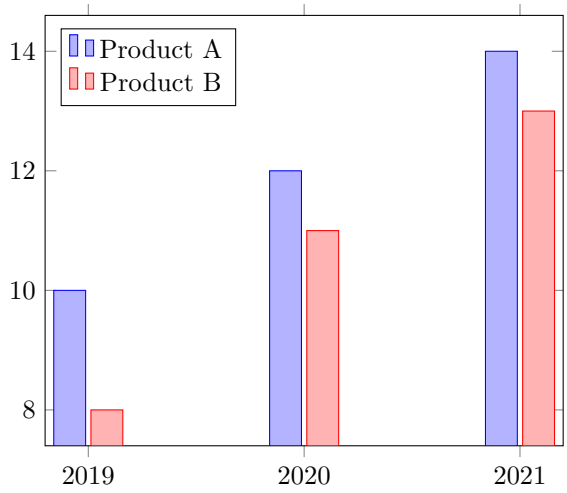

Figure 3: Grouped Bar Chart

Key Parameters: - `bar width` → thickness of bars - `legend pos=north west` → position of legend

—

4) Stacked Bar Chart

```
\begin{figure}[H]
\centering
\begin{tikzpicture}
\begin{axis}[
    ybar stacked,
    symbolic x coords={Q1,Q2,Q3},
    xtick=data
]
\addplot coordinates {(Q1,3) (Q2,4) (Q3,2)};
\addplot coordinates {(Q1,2) (Q2,3) (Q3,5)};
\legend{Online,Offline}
\end{axis}
\end{tikzpicture}
\caption{Stacked Bar Chart}
\end{figure}
```

Output Code (copy to compile):

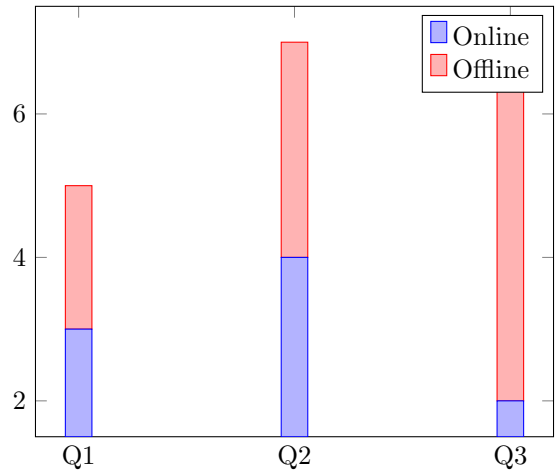

Figure 4: Stacked Bar Chart

Key Parameters: - `ybar stacked` → second bar stacked on first - Used for "total + breakdown" comparison

—

Exercises

Complete the following tasks using Bar Plots in LaTeX. Each exercise is based on the 4 types of bar plots covered in class.

Exercise 1: Simple Vertical Bar Chart

Data:

Category	Value
A	5
B	8
C	4

Expected outcome: Bars should rise to heights 5, 8, and 4.

Exercise 2: Simple Horizontal Bar Chart

Data:

Product	Sales
Pen	20
Book	15
Bag	25

Expected outcome: Bars extend horizontally to 20, 15, and 25.

Exercise 3: Grouped Bar Chart

Data1 (Boys):

Game	Score
Cricket	40
Football	35
Hockey	45

Data2 (Girls):

Game	Score
Cricket	30
Football	38
Hockey	42

Expected outcome: Side-by-side grouped bars for Boys vs Girls in each category.

Exercise 4: Stacked Bar Chart

Using the same Data1 and Data2 above:

Expected outcome: Stacked bar heights:

- Cricket = 40 + 30 = 70
- Football = 35 + 38 = 73
- Hockey = 45 + 42 = 87

Stacked bars must visually show total height with two color levels.