LaTeX and Friends
Data Plots

http://csweb.ucc.ie/~dongen/LAF/LAF.html

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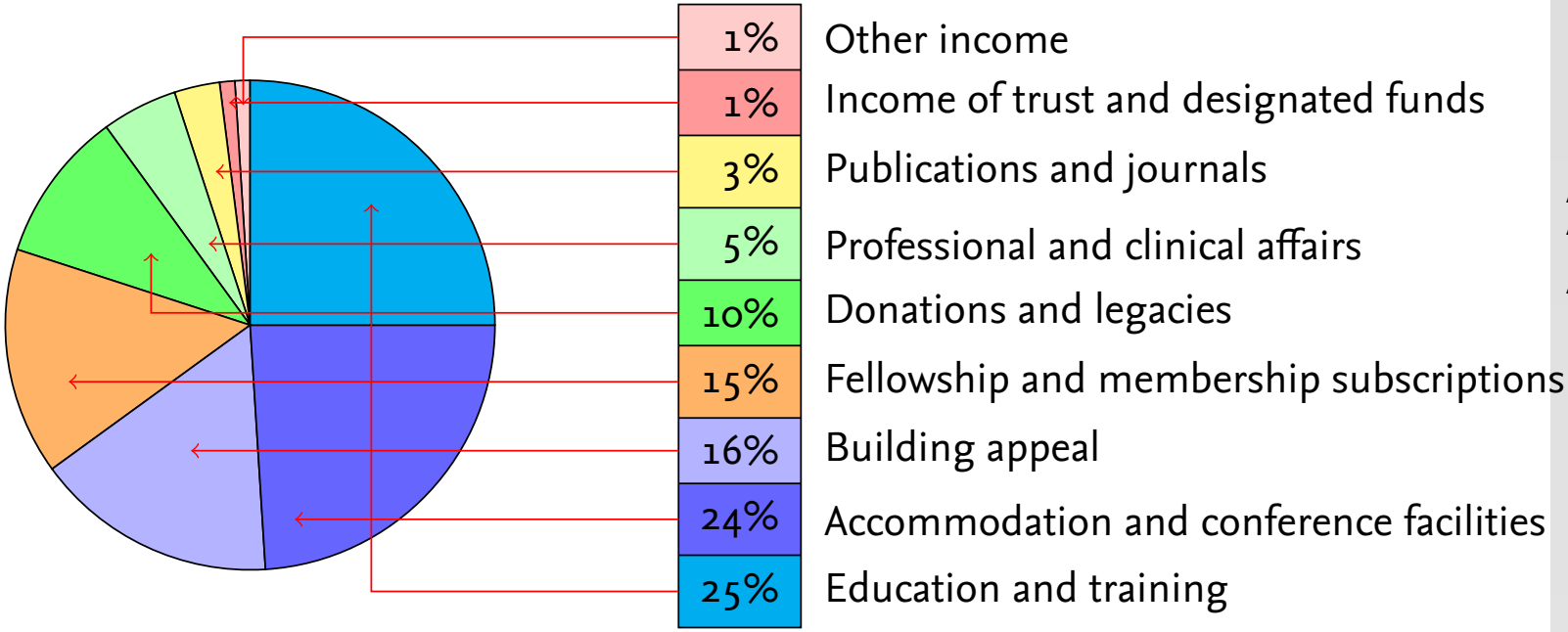
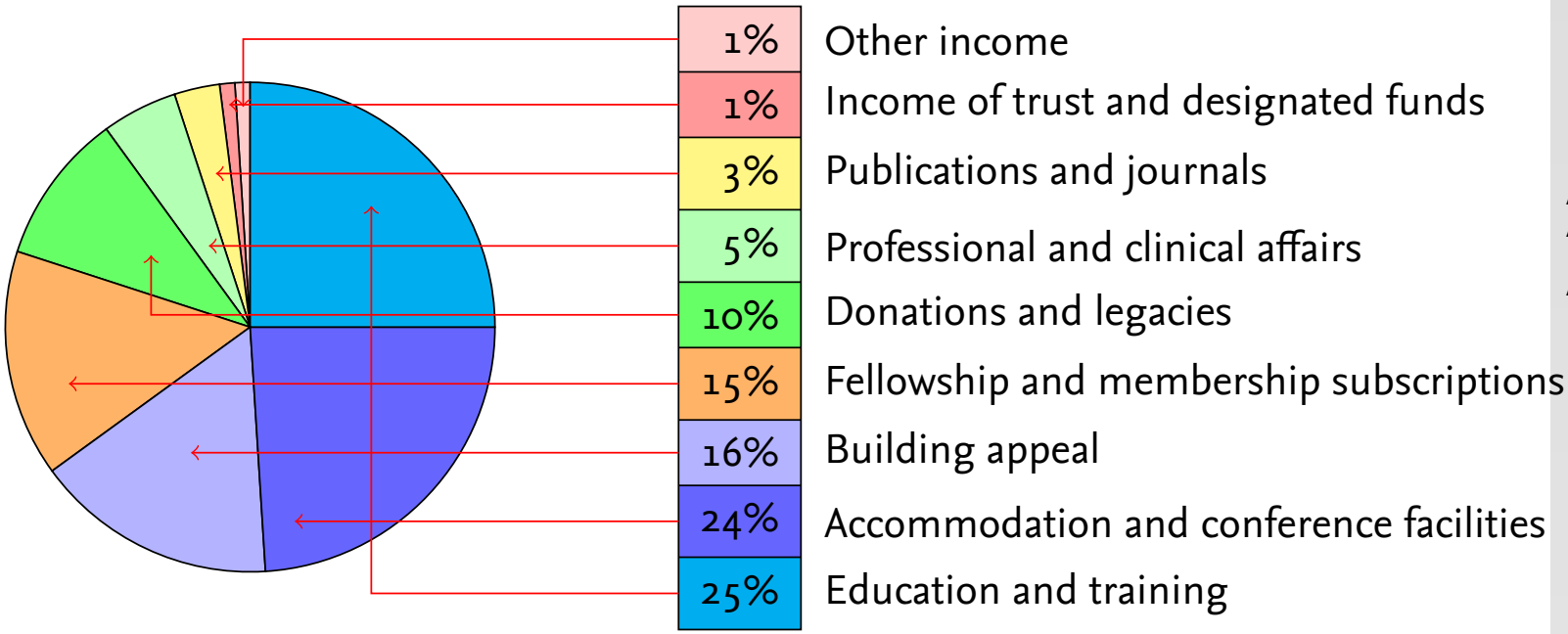
The Purpose of Data Plots

global trends	Show data has “trend.”
differences	Show differences between functions/trends.
rate of change	Show rate of change within single function.

Pie Charts



Pie Charts: Why Not Use a Table?



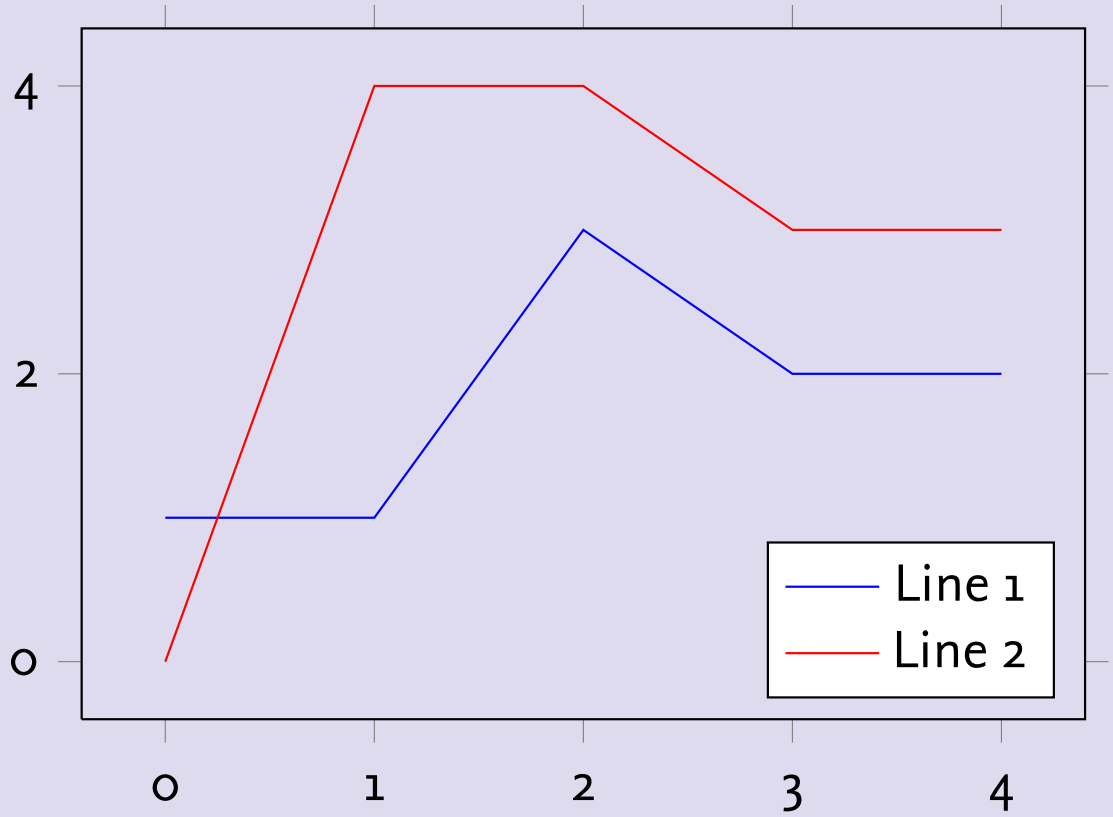
The axis Environment

LaTeX Input

```
\begin{tikzpicture}
\begin{axis}[width=8cm,height=6cm,tick align=outside]
  \addplot[draw=blue]
          coordinates {(0,1) (1,1) (2,3) (3,2) (4,2)};
  \addlegendentry{Line 1}
  \addplot[draw=red]
          coordinates {(0,0) (1,4) (2,4) (3,3) (4,3)};
  \addlegendentry{Line 2}
\end{axis}
\end{tikzpicture}
```

Output

LaTeX Output



Creating Graphs

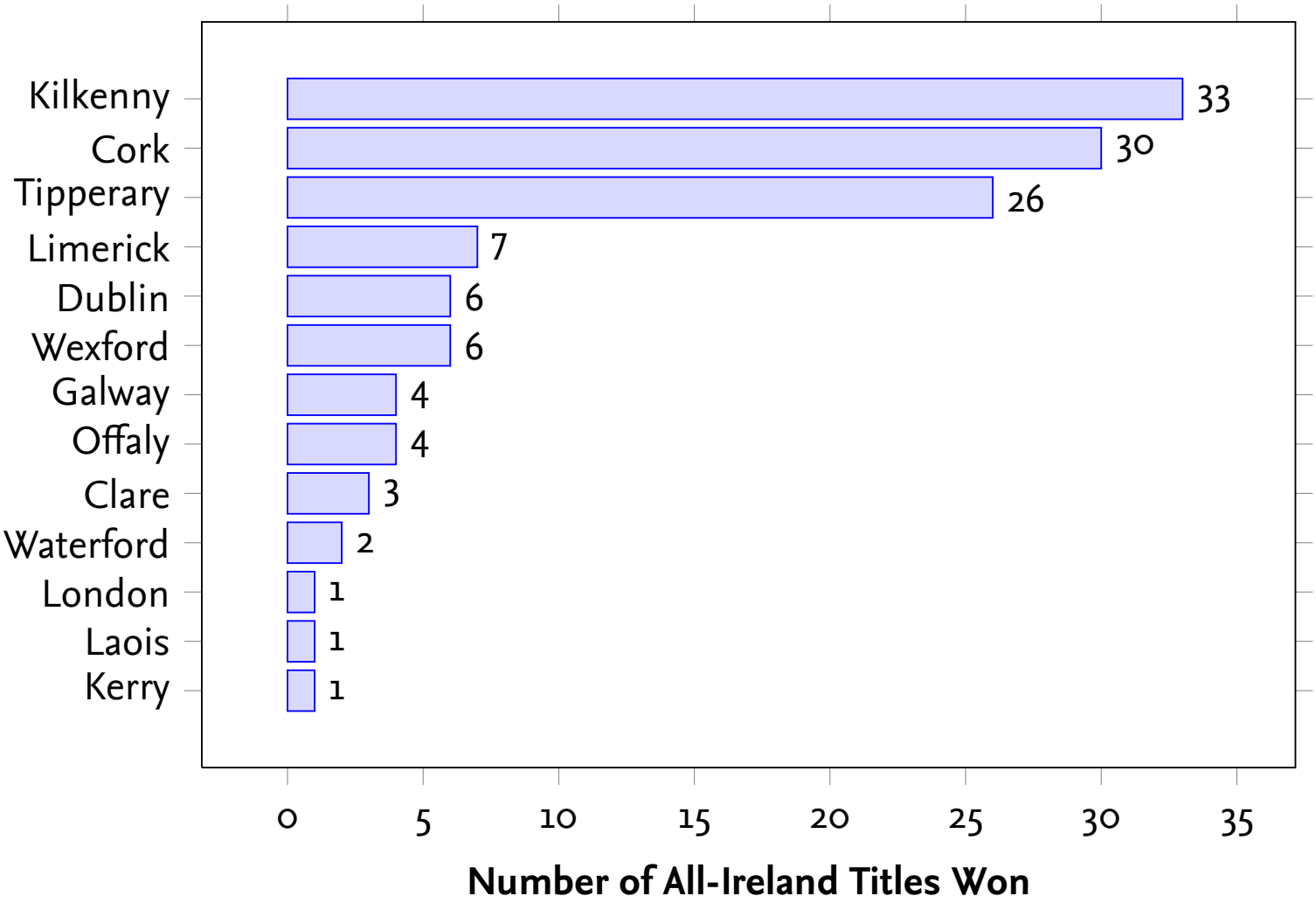
- `pgfplots` lets you draw graphs in various formats.
- Implemented on top of `tikz`.
- Resulting graphs have a consistent, professional look and feel.
- Package also lets you import data from `matlab`.
- The manual is impressive [Feuersänger 2010].

The \pgfplotsset Command

LaTeX Input

```
\pgfplotsset{width=6cm,height=4cm,
             compat=newest,
             enlargelimits=0.18}
```

Bar Graphs

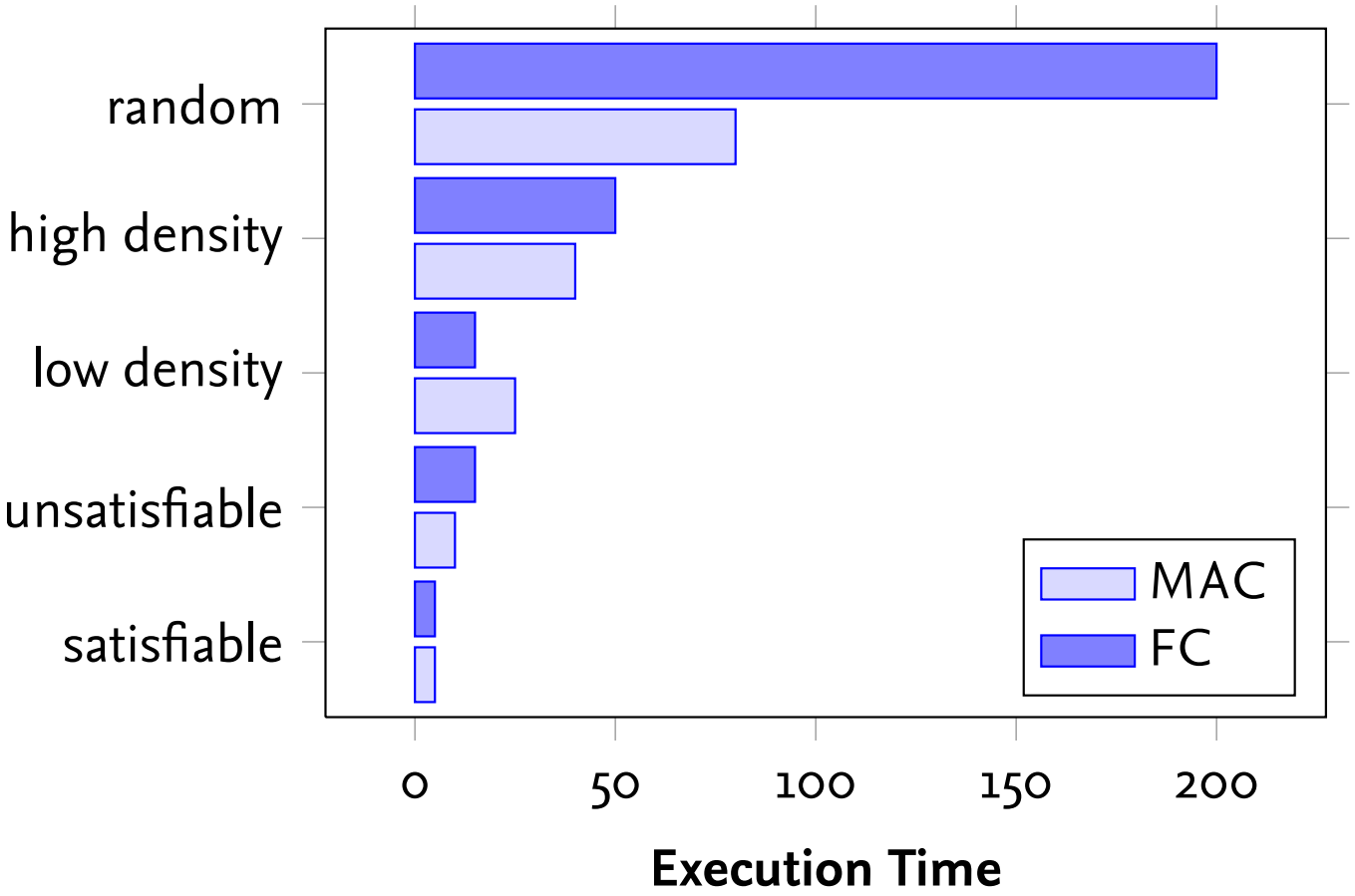


Creating Bar Graphs

LaTeX Input

```
\begin{axis}
      [xbar,width=11cm,height=8cm,bar width=10pt,enlargelimits=0.13,
       nodes near coords,
       nodes near coords align=horizontal,
       point meta=x * 1, % The displayed number.
       xlabel=\textbf{Frequency of Winning the Final},
       tick align=outside,
       xtick={0,5,...,35}, ytick={1,...,13},
       yticklabels={Kerry,Laois,London,Waterford,Clare,Offaly,Galway
                    Wexford,Dublin,Limerick,Tipperary,Cork,Kilkenny}]
\addplot[draw=blue, fill=blue!15] coordinates
        {(1,1) (1,2) (1,3) (2,4) (3,5) (4,6) (4,7)
         (6,8) (6,9) (7,10) (26,11) (30,12) (33,13)};
\end{axis}
```

Paired Bar Graphs



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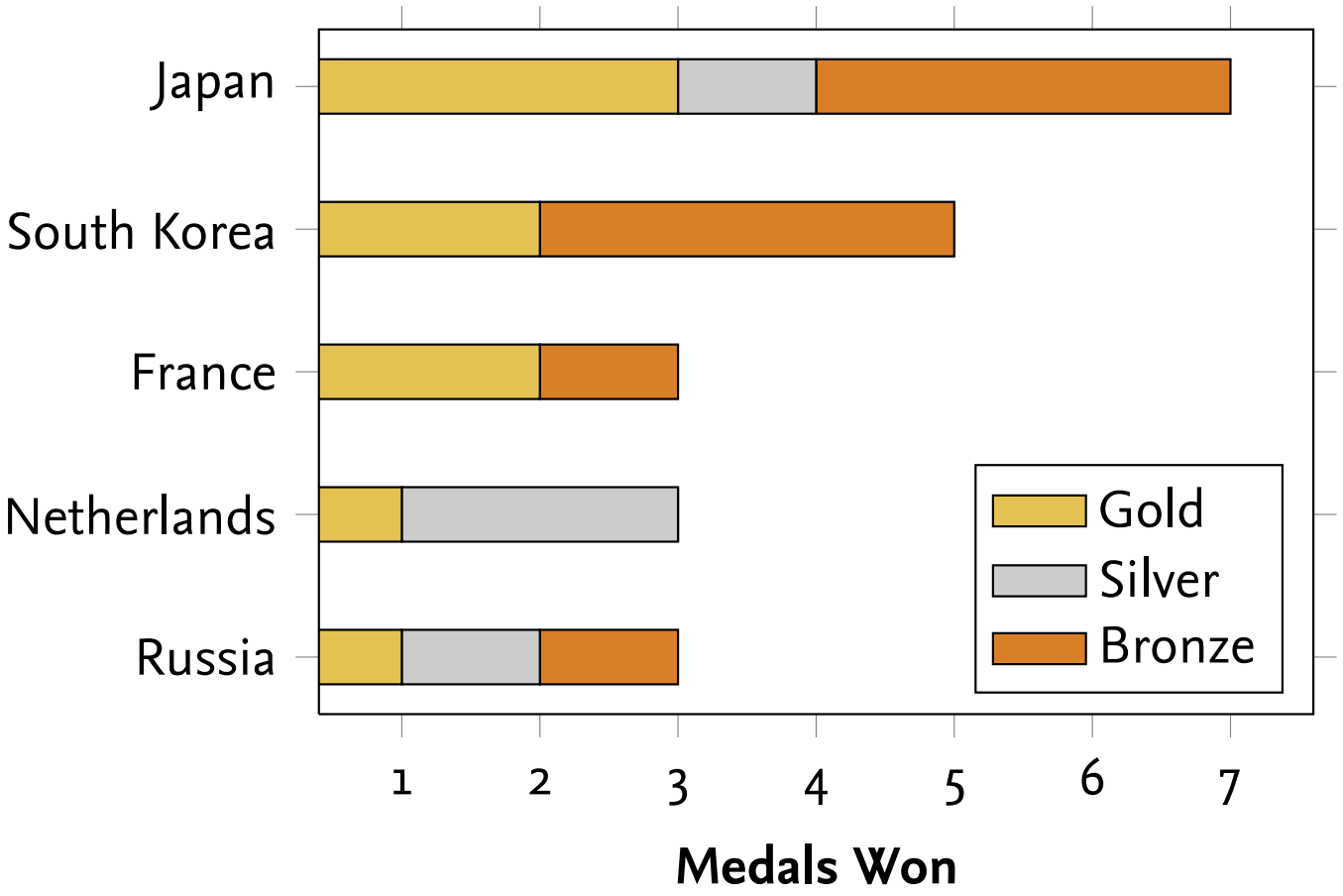
Creating Paired Bar Graphs

LaTeX Input

```
\begin{axis}
      [xbar,enlargelimits=0.14,width=8cm,height=6cm,,
       bar width=10pt,area legend,legend pos=south east,
       legend style={legend pos=north east,
                     cells={anchor=west}},
       tick align=outside,xlabel=\textbf{Execution Time},
       ytick={1,...,5},
       yticklabels={satisfiable,unsatisfiable,
                    low density,high density,random}]
\addplot[draw=blue,fill=blue!15]
        coordinates {(5,1) (10,2) (25,3) (40,4) (80,5)};
\addlegendentry{\textsc{MAC}}
\addplot[draw=blue,fill=blue!50]
        coordinates {(5,1) (15,2) (15,3) (50,4) (200,5)};
\addlegendentry{\textsc{FC}}
\end{axis}
```

Component Bar Graphs



Creating Component Bar Graphs

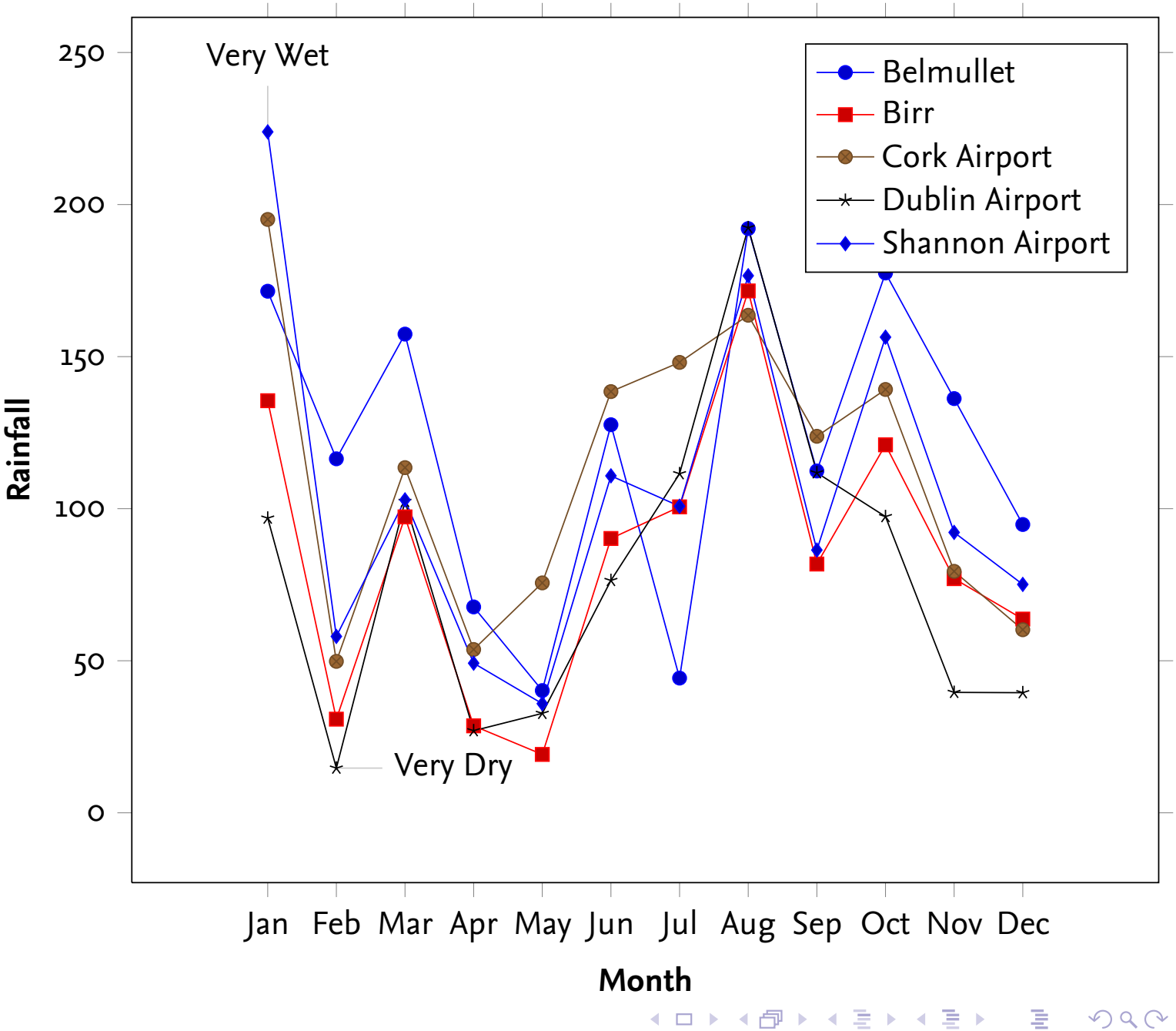
LaTeX Input

```
\begin{axis}
      [xbar stacked, stack plots=x, tick align=outside,
       width=8cm, height=6cm, bar width=10pt,
       legend style={cells={anchor=west}}, area legend,
       xlabel=\textbf{Medals Won}, ytick={1,...,5},
       yticklabels={Russia,Netherlands,France,
                    South Korea,Japan}]
\addplot[draw=black,yellow!50!brown]
        coordinates {(1,1) (1,2) (2,3) (2,4) (3,5)};
\addlegendentry{Gold}
\addplot[draw=black,white!60!gray]
        coordinates {(1,1) (2,2) (0,3) (0,4) (1,5)};
\addlegendentry{Silver}
\addplot[draw=black,orange!70!gray]
        coordinates {(1,1) (0,2) (1,3) (3,4) (3,5)};
\addlegendentry{Bronze}
\end{axis}
```

Coordinate Systems

`axis cs`	Coordinates same as plot coordinates.
`rel axis cs`	Unit square scaled to plot coordinates.
`xticklabel cs`	Projection of relative coordinates on to *x*-axis.
`yticklabel cs`	Projection of relative coordinates on to *y*-axis.

Line Graphs

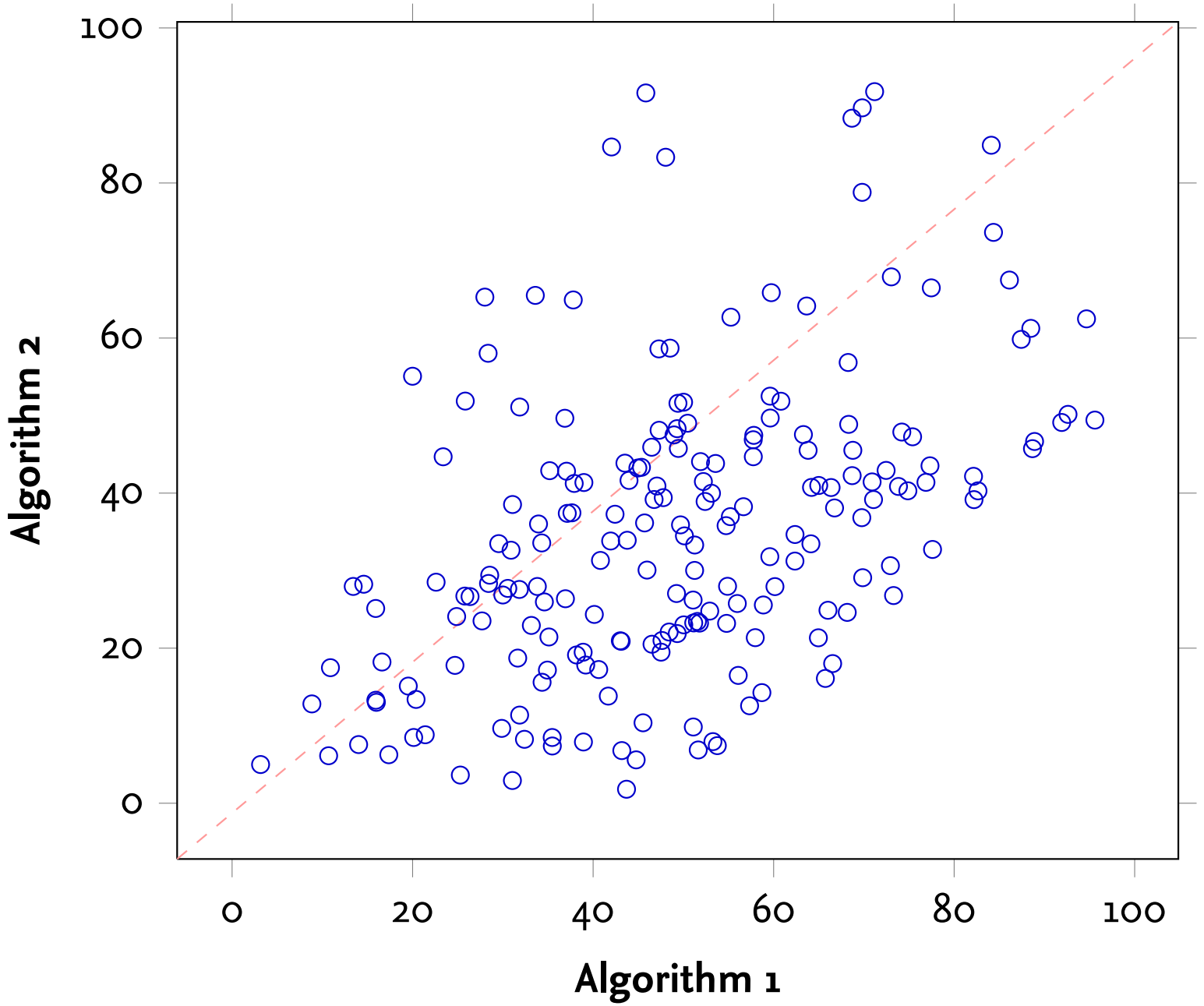


Creating Line Graphs

LaTeX Input

```
\begin{axis}
      [width=\textwidth,enlargelimits=0.18,tick align=outside,
       legend style={cells={anchor=west},legend pos=north east},
       xticklabels={Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec},
       xtick={1,2,3,4,5,6,7,8,9,10,11,12},
       xlabel=\textbf{Month}, ylabel=\textbf{Rainfall}]
\node[coordinate,pin=above:{Very Wet}] at (axis cs:1,223.9) {};
\node[coordinate,pin=right:{Very Dry}] at (axis cs:2,14.7)  {};
\addplot+[sharp plot] coordinates
        {(1,171.5) (2,116.4) (3,157.4) (4,67.7) (5,40.2) (6,127.6)
         (7,44.3) (8,192.1) (9,112.4) (10,177.5) (11,136.2) (12,94.8)};
\addlegendentry{Belmullet}
\addplot+[sharp plot] coordinates
        {(1,135.5) (2,30.8) (3,97.3) (4,28.6) (5,19.2) (6,90.2
         (7,100.6) (8,171.6) (9,81.8) (10,121.0) (11,77.0) (12,63.7)};
\addlegendentry{Birr}
\addplot+[sharp plot] coordinates
        {(1,195.1) (2,49.8) (3,113.5) (4,53.7) (5,75.6) (6,138.5
         (7,148.1) (8,163.6) (9,123.8) (10,139.2) (11,79.4) (12,60.2)};
\addlegendentry{Cork Airport}
\addplot+[sharp plot] coordinates
        {(1,96.9) (2,14.7) (3,102.4) (4,27.0) (5,32.7) (6,76.4
         (7,111.5) (8,192.4) (9,111.8) (10,97.4) (11,39.6) (12,39.5)};
\addlegendentry{Dublin Airport}
\addplot+[sharp plot] coordinates
        {(1,223.9) (2,58.0) (3,102.9) (4,49.2) (5,35.9) (6,110.8
         (7,100.8) (8,176.6) (9,86.4) (10,156.4) (11,92.2) (12,75.1)};
```

Scatter Plots



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Creating Scatter Plots

LaTeX Input

```
\begin{axis}
      [width=\textwidth, tick align=outside,
       xlabel=\textbf{Algorithm~1},
       ylabel=\textbf{Algorithm~2}]
\addplot{scatter,only marks,mark=o,
         draw=blue,scatter src=explicit}
        file {data.dat};
\draw[dashed,red!40]
     (rel axis cs:0,0) -- (rel axis cs:1,1);
\end{axis}
```

Input

```
42.03947249608177 84.64821463672999
35.46530214577332 8.475731351150044
47.62850850655307 20.989535350656062
49.440357534112174 45.76240163194472
55.26331078124413 62.693338544226066
43.70125549717245 1.8025725612135672
53.27409074259773 7.944849302471692
82.63910390525706 40.29215474931301
65.73269537881723 16.095506642381075
69.86468729668312 29.08789038430851
...
```

Bibliography


Feuersänger, Christian [5th Aug. 2010]. *Manual for Package* PGFPLOTS. Version 1.4.1.

Acronyms and Abbreviations

AMS	American Mathematical Society
API	Application Programming Interface
APL	A Programming Language
CTAN	Comprehensive TEX Archive Network
CD	Compact Disk
FAQ	Frequently Asked Question
GUI	Graphical User Interface
IDE	Integrated Development Environment
ISBN	International Standard Book Number
OS	Operating System
SI	Système International d'Unités/International System of Units
TUG	TEX Users Group
URL	Uniform Resource Locator
WYSIWYG	What You See Is What You Get

About this Document

- This document was created with `pdflatex`.
- The LaTeX document class is `beamer`.