1 Figures with matlab2tikz

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

```
function Beispiel0()

  initialize();           % a set of clear and load commands
  color = colorlist();    % loading a set of 8 colors that are distinguishable even for colorblind people

  number_of_figures = 2;  % number of figures
  number_of_axes    = 1;  % number of axes per figure

  config = create_figures_and_load_saved_position(number_of_figures, number_of_axes);

  tikz              = tikzoptions(); % a set of predefined options for matlab2tikz
  tikz.texfilename = 'Beispiel0';   % single settings can be overwritten after loading
  tikz.makelegend  = 1;
  tikz.legend      = 'Variation 1, Variation 2';

 %================================ Plot Setup ============================================

  x = 1:1:200;
  y1 = 10*sin(x/(10*pi));
  y2 = 10*cos(x/(10*pi));

  plot(config{1}.ax(1), x, y1, 'Color', color{2}, 'LineStyle', '--', 'LineWidth', 2);
  plot(config{1}.ax(1), x, y2, 'Color', color{3},                    'LineWidth', 1);
  plot(config{2}.ax(1), x, y2, 'Color', color{4});

  for inx = 1:1:number_of_figures
        title(config{inx}.ax(1), ['A simple plot exported with matlab2tikz', num2str(inx)], 'FontSize', 14);
       xlabel(config{inx}.ax(1), 'Variation',                                               'FontSize', 12);
       ylabel(config{inx}.ax(1), 'Test 1',                                                  'FontSize', 12);
  end

 %=======================================================================================

  for inx = 1:1:number_of_figures
    m2t_export(config{inx}.ax(1), config{inx}.fig(inx), tikz.texfilename, num2str(inx), tikz);
  end

end
```

Listing 1.1 *A simple example of 2 similar figures and exporting them with matlab2tikz. For each figure there will be a tex file with a standalone version that can be quickly be translated to pdf and from there to svg (a foss vector image format) and emf (vector image format for Windows). There is a small bash script for that job available* `convert_pdf2svg2emf.sh`

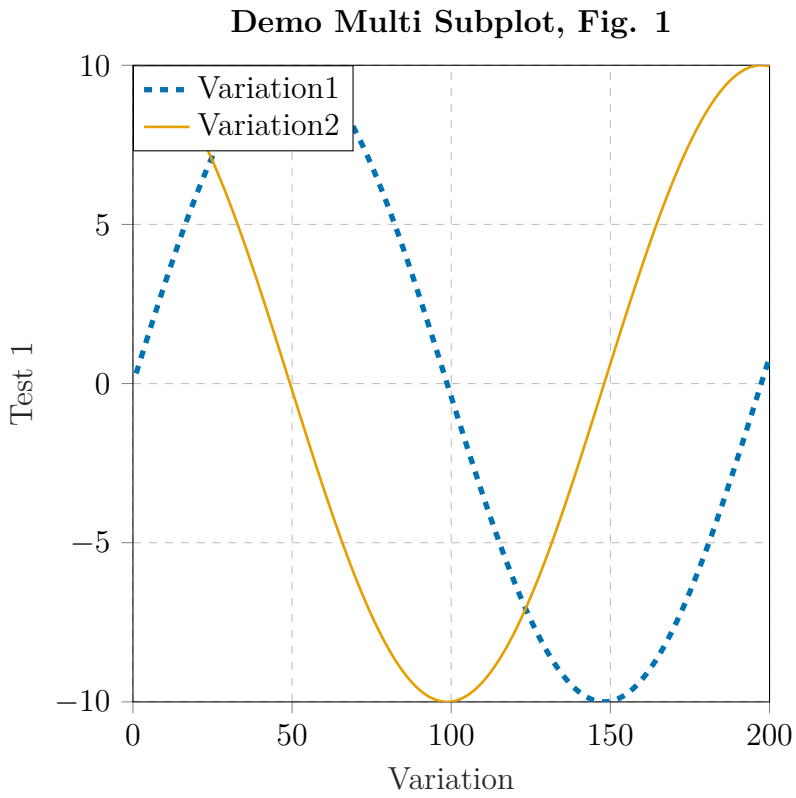

Figure 1.1 *This is an example of a simple Matlab plot that was exported with matlab2tikz. The tex file of this image is build with during the build of the entire document.*

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

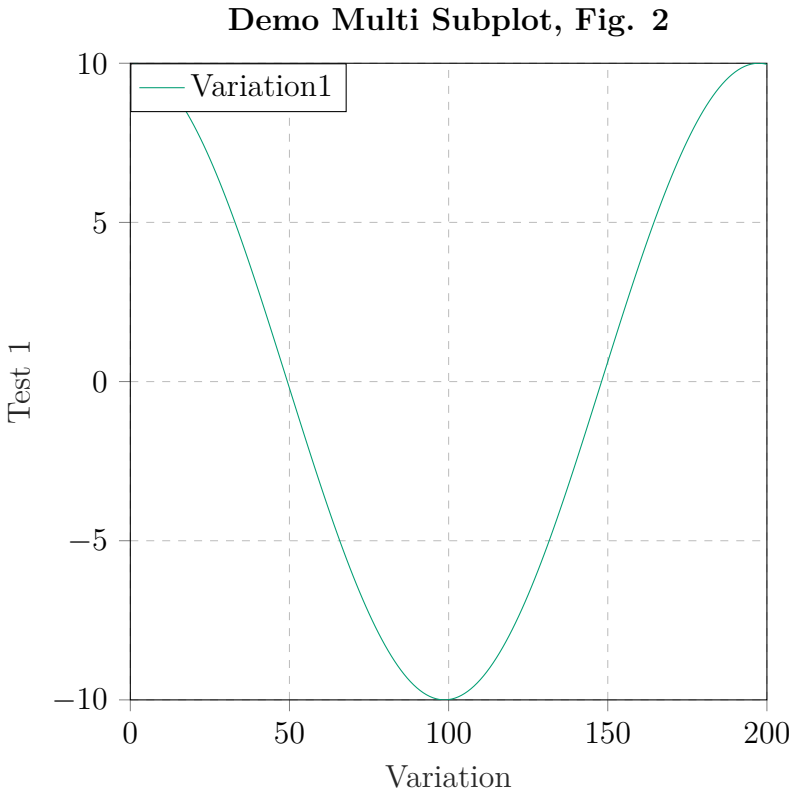

Figure 1.2 *Another plot*

```
function Beispiel2()

  initialize();
  color = colorlist();

  number_of_figures = 2;
  number_of_axes    = 1;

  config = create_figures_and_load_saved_position(number_of_figures, number_of_axes);

  tikz             = tikzoptions();
  tikz.barplot     = 1;
  tikz.texfilename = 'Beispiel2';
  tikz.makelegend  = 1;
  tikz.legend      = 'Region 1, Region 2, Region 3';

  xLabelFontSize = 16;
  yLabelFontSize = 12;

  y = normrnd(30,10,100000,1);

  binwidth = 1;
  xbins = (-10:binwidth:70);
  [ydata, xdata] = hist(y, xbins);
  xbins1 = (-10:binwidth:70)-binwidth/2;
  [ydata1, xdata1] = hist(y, xbins1);

  barwidth = 1;
  bar(config{1}.ax(1), xdata(xdata >= 40), ydata(xdata >= 40),                                barwidth, 'FaceColor',
      color{3});
  bar(config{1}.ax(1), xdata(xdata > 20 & xdata < 40), ydata(xdata > 20 & xdata < 40), barwidth, 'FaceColor',
      color{4});
  bar(config{1}.ax(1), xdata(xdata <= 20), ydata(xdata <= 20),                                barwidth, 'FaceColor',
      color{2});

  bar(config{2}.ax(1), xdata1(xdata1 >= 40), ydata1(xdata1 >= 40),                                barwidth, '
      FaceColor', color{3});
  bar(config{2}.ax(1), xdata1(xdata1 > 20 & xdata1 < 40), ydata1(xdata1 > 20 & xdata1 < 40), barwidth, '
      FaceColor', color{4});
  bar(config{2}.ax(1), xdata1(xdata1 <= 20), ydata1(xdata1 <= 20),                                barwidth, '
      FaceColor', color{2});

  [xnorm,ynorm] = fitnormdist(y);
  plot(config{1}.ax(1), xnorm, ynorm, 'Color', color{1}, 'LineStyle', '--', 'LineWidth', 1);
  plot(config{2}.ax(1), xnorm, ynorm, 'Color', color{1}, 'LineStyle', '--', 'LineWidth', 1);

  for inx = 1:number_of_figures
    title(config{inx}.ax(1), 'Demo Barplot', 'FontSize', 25);
    xlabel(config{inx}.ax(1), 'Variation [\%]', 'FontSize', xLabelFontSize)
    ylabel(config{inx}.ax(1), 'Häufigkeit', 'FontSize', yLabelFontSize)
    set(config{inx}.ax(1), 'xtick', [-20 -10 0 10 20 25 30 35 40 50 60 70 80])
    %m2t_export(config{inx}.ax(1), config{inx}.fig(1), tikz.texfilename, num2str(inx), tikz);
  end

  m2t_export(config{1}.ax(1), config{1}.fig(1), tikz.texfilename, num2str(1), tikz);

end
```

Listing 1.2 *eeeee*

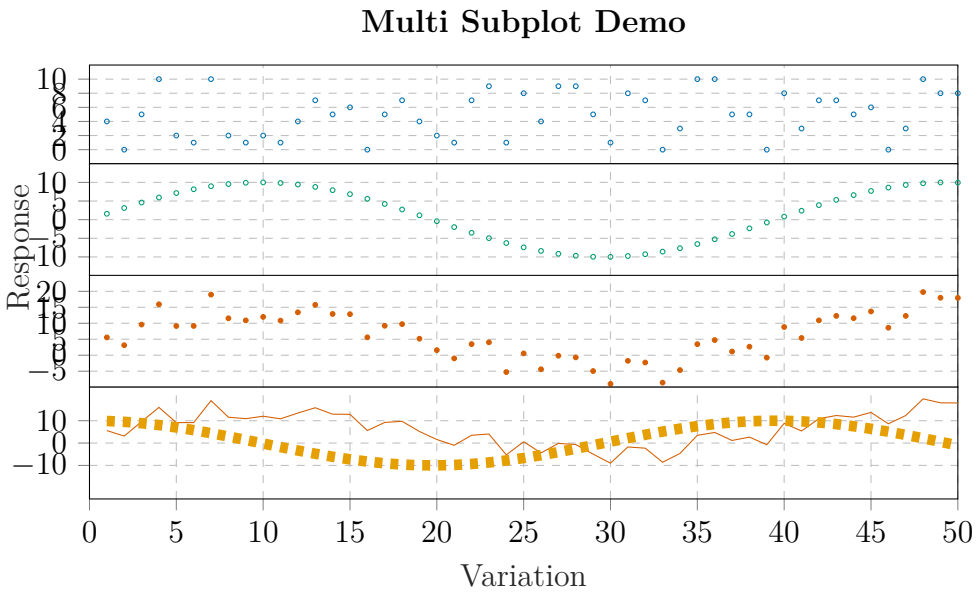

Figure 1.3 *This is an example of a Matlab subplot with a single ylabel.*

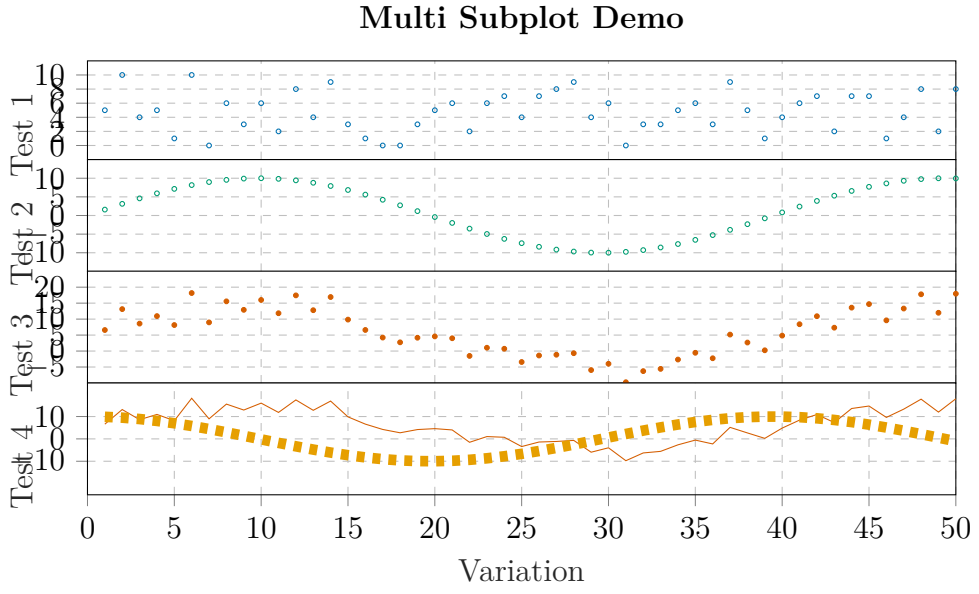

Figure 1.4 *This is an example of a Matlab subplot with a ylabel for each plot.*

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris.

Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

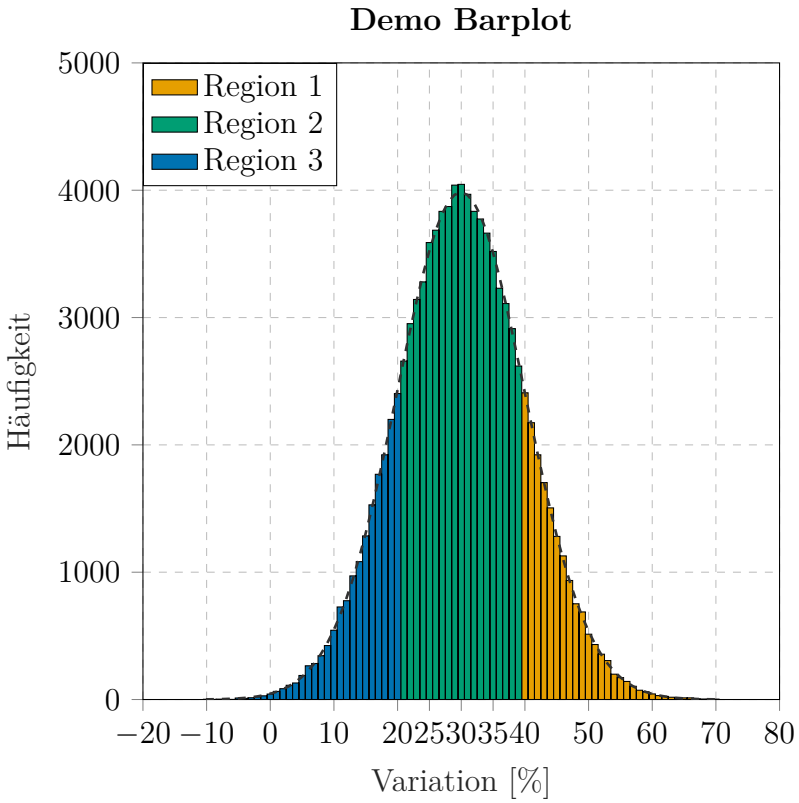

Figure 1.5 *A barplot with a special legend*

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae

ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

```
function Beispiel3()

  initialize();
  color = colorlist();

  number_of_figures = 1;
  number_of_axes    = 1;

  config = create_figures_and_load_saved_position(number_of_figures, number_of_axes);

  tikz = tikzoptions();
  tikz.texfilename = 'Beispiel3';

  xLabelFontSize = 16;
  yLabelFontSize = 12;

  x = 1:1:30;
  y = 1:1:30;
  [xx, yy] = meshgrid(x, y);
  z = xx.^2+100*sin(yy);

  cmap = colormap(jet);
  cmap = [cmap; [0 0 0]];
  size(z);
  Zcolor = zeros(size(z));
  threshold = 200;

  inter = 1;
  step = threshold/(max(size(cmap))-1);
  Zcolor(z >=  0 & z < threshold/max(size(cmap))) = 1;  % first color
  for inx = 1:(max(size(cmap))- 1)
    Zcolor(z > step*inx & z < step*(inx+1)) = inter;  % intermediate color values
    inter = inter + 1;
  end
  Zcolor(z >= threshold - 1)    = max(size(cmap)); % last color for all z values above threshold

  tikz.h = colorbar(config{1}.ax(1));
  ylabel(tikz.h, '$x^{2}+100\cdot\sin\left(y\right)$', 'FontSize', 20);

  set(tikz.h, 'ytick', [10 15 20 25 30 40 50 60 70]);

  colormap(config{1}.ax(1), cmap)
  surf(config{1}.ax(1), x,y,z,Zcolor)

  title(config{1}.ax(1), 'Demo Surface Plot', 'FontSize', 25);
  xlabel(config{1}.ax(1), 'variable x', 'FontSize', xLabelFontSize)
  ylabel(config{1}.ax(1), 'variable y', 'FontSize', yLabelFontSize)
  zlabel(config{1}.ax(1), 'i am invisible')

  xlim(config{1}.ax(1), [1 30])
  ylim(config{1}.ax(1), [1 30])
  set(config{1}.ax(1), 'xtick', [10 15 20 25 30])

  m2t_export(config{1}.ax(1), config{1}.fig(1), tikz.texfilename, num2str(1), tikz);
end
```

Listing 1.3 *eeeee*

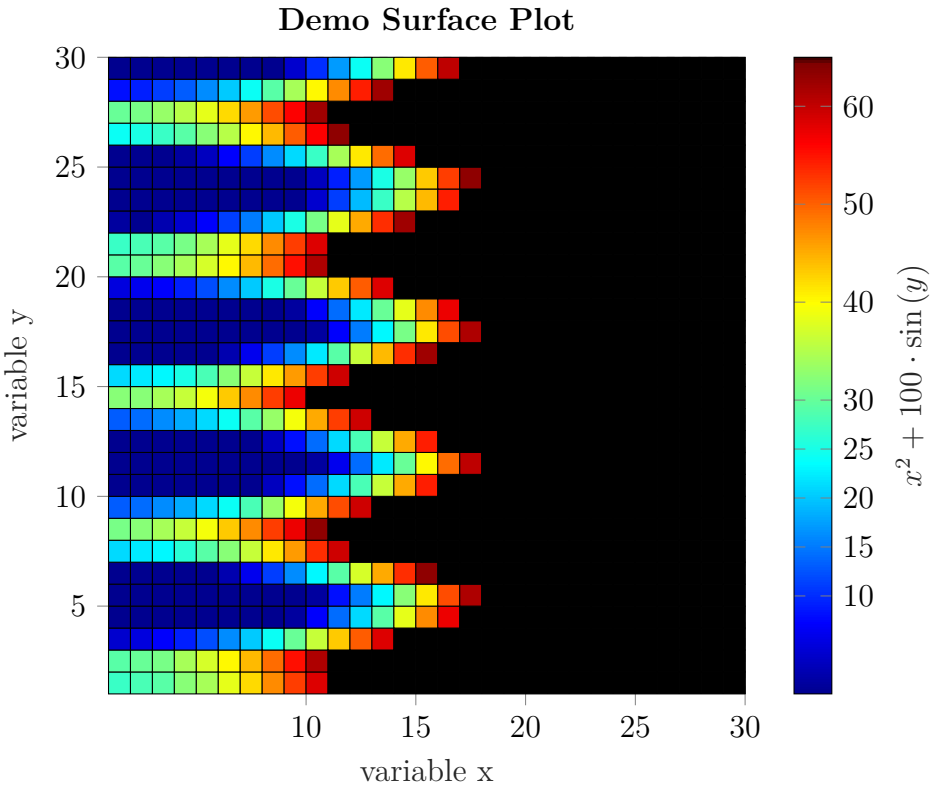

Figure 1.6 *A surface plot with a filter for data exceeding a limit.*

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut

massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
function Beispiel4()

  initialize();
  color = colorlist();

  number_of_figures = 1;
  number_of_axes    = 1;

  config = create_figures_and_load_saved_position(number_of_figures, number_of_axes);
  grid(config{1}.ax(1), 'off');

  tikz                      = tikzoptions();
  tikz.texfilename          = 'Beispiel4';
  tikz.boxplot              = 1;
  tikz.customboxplotlegend = 1;
  tikz.set_noSize           = true;

  xLabelFontSize = 16;
  yLabelFontSize = 12;

  N = 100;
  upperlimit = 40;
  lowerlimit = 20;
  x = [ randi([0 1], N, 4) , [randi([1 4], N/2, 1) ; randi([3 5], N/2, 1)]];

  a = 20;
  b = 40;
  r1 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 1 & x(:,2) == 1 & x(:,3) == 1);
  r2 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 1 & x(:,2) == 1 & x(:,3) == 0);
  r3 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 1 & x(:,2) == 0 & x(:,3) == 1);
  r4 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 1 & x(:,2) == 0 & x(:,3) == 0);
  r5 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 0 & x(:,2) == 1 & x(:,3) == 1);
  r6 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 0 & x(:,2) == 1 & x(:,3) == 0);
  r7 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 0 & x(:,2) == 0 & x(:,3) == 1);
  r8 = ((b-a).*rand(N, 1, 'double')+a).*(x(:,1) == 0 & x(:,2) == 0 & x(:,3) == 0);

  r3 = r3-r1/2;
  r8 = r8/4+r7/4+r6/2;

  y = [r1 , r2, r3, r4, r5, r6, r7, r8];
  y = r1+r2+r3+r4+r5+r6+r7+r8;
  g = x(:,5);

  tikz.markersizedatapoints = 5;
  tikz.markersizemeanvalues = 10;
  for inx = 1:1:max(size(unique(g)))
    scatter(config{1}.ax(1), unique(g)(inx), mean(y(g == unique(g)(inx))),
                                                tikz.markersizemeanvalues, 'filled', 'MarkerFaceColor', color{
        inx+1})
    scatter(config{1}.ax(1), g(g == unique(g)(inx)), y(g == unique(g)(inx)),
                                              tikz.markersizedatapoints,          'MarkerEdgeColor', color{inx
        +1})
    scatter(config{1}.ax(1), g(g == unique(g)(inx) & y <= lowerlimit), y(g == unique(g)(inx) & y <= lowerlimit
        ), tikz.markersizedatapoints, 'filled', 'MarkerFaceColor', color{inx+1})
    scatter(config{1}.ax(1), g(g == unique(g)(inx) & y >= upperlimit), y(g == unique(g)(inx) & y >= upperlimit
        ), tikz.markersizedatapoints, 'filled', 'MarkerFaceColor', color{inx+1})
    groupsize(inx) = max(size(y(g == unique(g)(inx))));
  end
  groupsize

  line([0 6],[upperlimit upperlimit], 'LineStyle', '--');
  line([0 6],[lowerlimit lowerlimit], 'LineStyle', ':');

  boxplot(y, g);

  set(gca, 'xtick',[1:1:5]);
  set(gca, 'xticklabel', {'Mon','Tue','Wed','Thu','Fri'})
  xlabel(gca, 'Day', 'FontSize', 20);
  ylabel(gca, 'Average Velocity for each Delivery $\frac{km}{h}$', 'FontSize', 20);
  title('Demo Boxplot', 'FontSize', 25);

  xlim([0 6]);
  ylim([0 70]);

  m2t_export(config{1}.ax(1), config{1}.fig(1), tikz.texfilename, num2str(1), tikz);
end
```

Listing 1.4 *eeeee*

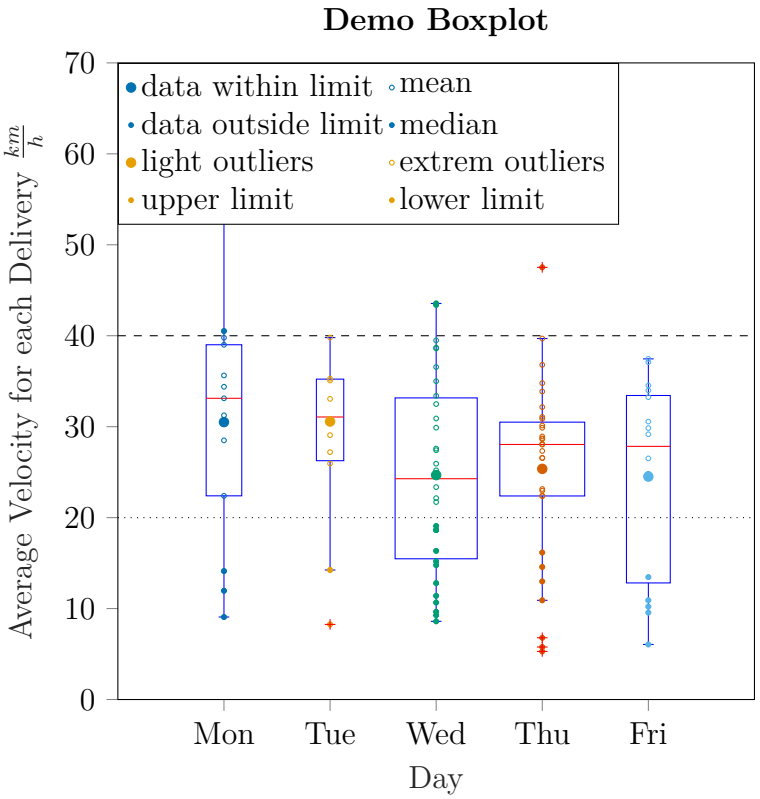

Figure 1.7 *A boxplot with grouping and data highlighting.*

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae

ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

```
function Beispiel5()

  initialize();
  color = colorlist();

  number_of_figures = 1;
  number_of_axes    = 1;

  config = create_figures_and_load_saved_position(number_of_figures, number_of_axes);
  grid(config{1}.ax(1), 'off');

  tikz             = tikzoptions();
  tikz.texfilename = 'Beispiel5';

  xLabelFontSize = 16;
  yLabelFontSize = 12;

  N = 300;
  upperlimit = 40;
  lowerlimit = 20;
  x = [ randi([0 1], N, 4) , [randi([1 4], N/2, 1) ; randi([3 5], N/2, 1)]];
  x = [ (1:1:N)' , x ];

  inx1 = 2; inx2 = 3; inx3 = 4;
  a = 2; b = 15; r1 = (a.*randn(N,1) + b).*(x(:,inx1) == 1 & x(:,inx2) == 1 & x(:,inx3) == 1);
  a = 2; b = 15; r2 = (a.*randn(N,1) + b).*(x(:,inx1) == 1 & x(:,inx2) == 1 & x(:,inx3) == 0);
  a = 2; b = 15; r3 = (a.*randn(N,1) + b).*(x(:,inx1) == 1 & x(:,inx2) == 0 & x(:,inx3) == 1);
  a = 2; b = 15; r4 = (a.*randn(N,1) + b).*(x(:,inx1) == 1 & x(:,inx2) == 0 & x(:,inx3) == 0);
  a = 5; b = 30; r5 = (a.*randn(N,1) + b).*(x(:,inx1) == 0 & x(:,inx2) == 1 & x(:,inx3) == 1);
  a = 3; b = 38; r6 = (a.*randn(N,1) + b).*(x(:,inx1) == 0 & x(:,inx2) == 1 & x(:,inx3) == 0);
  a = 5; b = 25; r7 = (a.*randn(N,1) + b).*(x(:,inx1) == 0 & x(:,inx2) == 0 & x(:,inx3) == 1);
  a = 5; b = 35; r8 = (a.*randn(N,1) + b).*(x(:,inx1) == 0 & x(:,inx2) == 0 & x(:,inx3) == 0);

  y = [r1, r2, r3, r4, r5, r6, r7, r8];
  y = r1+r2+r3+r4+r5+r6+r7+r8;

  tikz.markersizedatapoints = 50;

  group = 0;
  sum_member = 1;

  for g1 = 0:1:1
    for g2 = 0:1:1
      for g3 = 0:1:1
        group += 1;
        value(group) = {y(x(:,inx1) == g1 & x(:,inx2) == g2 & x(:,inx3) == g3)};
        position{group} = sum_member:1:sum_member + max(size(value{group})) - 1;
        zmax(group)  = max(position{group});
        zmean(group) = mean(position{group});
        sum_member  += max(size(value{group}));
      end
    end
  end

  scatter(config{1}.ax(1), position{1}', value{1}, tikz.markersizedatapoints,           'MarkerFaceColor',
        color{2}, 'MarkerEdgeColor', 'none');
  scatter(config{1}.ax(1), position{2}', value{2}, tikz.markersizedatapoints,           'MarkerFaceColor', '
        none',    'MarkerEdgeColor', color{2}, 'Linewidth', 1);
  scatter(config{1}.ax(1), position{3}', value{3}, tikz.markersizedatapoints,           'MarkerFaceColor',
        color{3}, 'MarkerEdgeColor', 'none');
  scatter(config{1}.ax(1), position{4}', value{4}, tikz.markersizedatapoints,           'MarkerFaceColor', '
        none',    'MarkerEdgeColor', color{3}, 'Linewidth', 1);
  scatter(config{1}.ax(1), position{5}', value{5}, tikz.markersizedatapoints, 'square', 'MarkerFaceColor',
        color{4}, 'MarkerEdgeColor', 'none');
  scatter(config{1}.ax(1), position{6}', value{6}, tikz.markersizedatapoints, 'square', 'MarkerFaceColor', '
        none',    'MarkerEdgeColor', color{4}, 'Linewidth', 1);
  scatter(config{1}.ax(1), position{7}', value{7}, tikz.markersizedatapoints, 'square', 'MarkerFaceColor',
        color{5}, 'MarkerEdgeColor', 'none');
  scatter(config{1}.ax(1), position{8}', value{8}, tikz.markersizedatapoints, 'square', 'MarkerFaceColor', '
        none',    'MarkerEdgeColor', color{5}, 'Linewidth', 1);

  for lindx = 1:7
    line(config{1}.ax(1), [zmax(lindx)+0.5 zmax(lindx)+0.5], [0 50], 'LineStyle', '--', 'Color', color{1});
  end

  sector = {'I','II','III','IV','V','VI','VII','VIII'};
  for lindx = 1:8
    text(zmean(lindx)-1, 2, sector{lindx})
  end

  xlabel(config{1}.ax(1), '$Deliveries sorted by Driver$', 'FontSize', 20);
```

```
74    ylabel(config{1}.ax(1), 'Average Velocity for each Delivery $\left[\frac{km}{h}\right]$', 'FontSize', 20);
75    title('Demo Scatter Plot with auto grouping', 'FontSize', 25);
76
77    xlim(config{1}.ax(1), [0 N]);
78    ylim(config{1}.ax(1), [0 50]);
79
80  % m2t_export(gca, gcf, tikz.texfilename, num2str(1), tikz);
81  end
```

Listing 1.5 *eeeee*

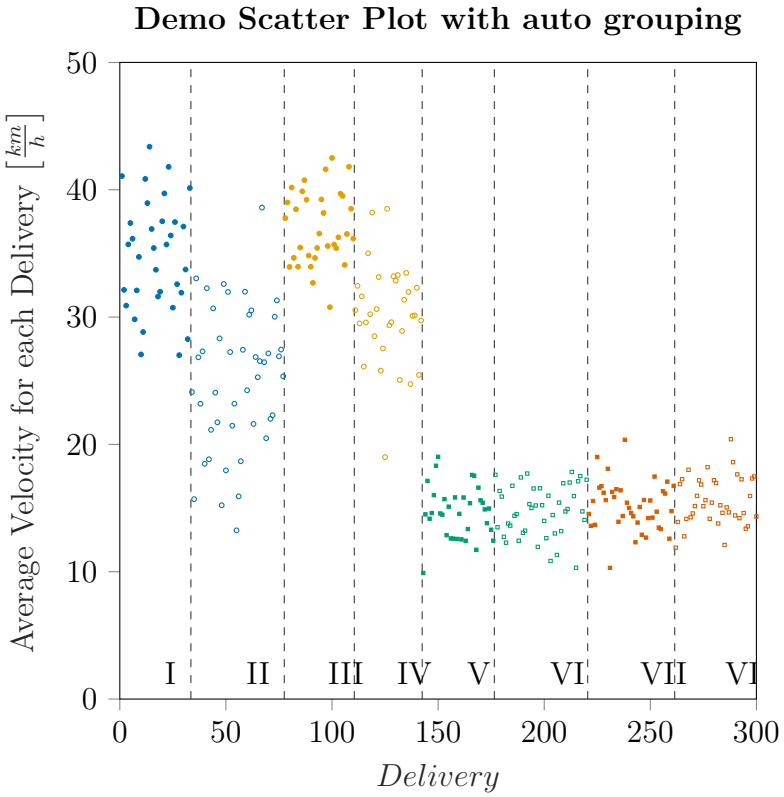

Figure 1.8 *A scatter plot with auto grouping*

List of Figures