

How to Make High Quality Plots in Matlab

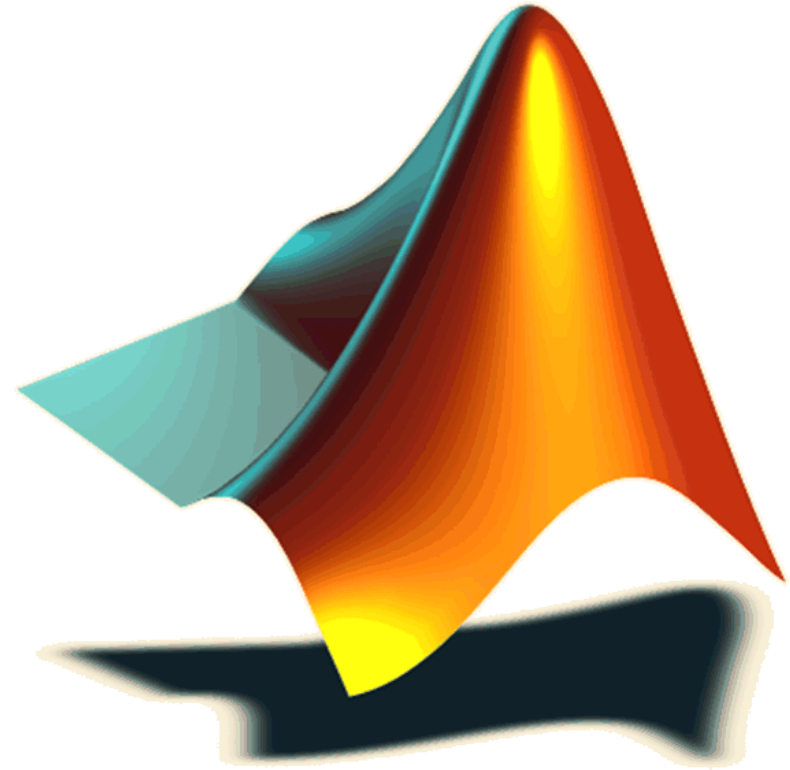
Mehdi Salmani

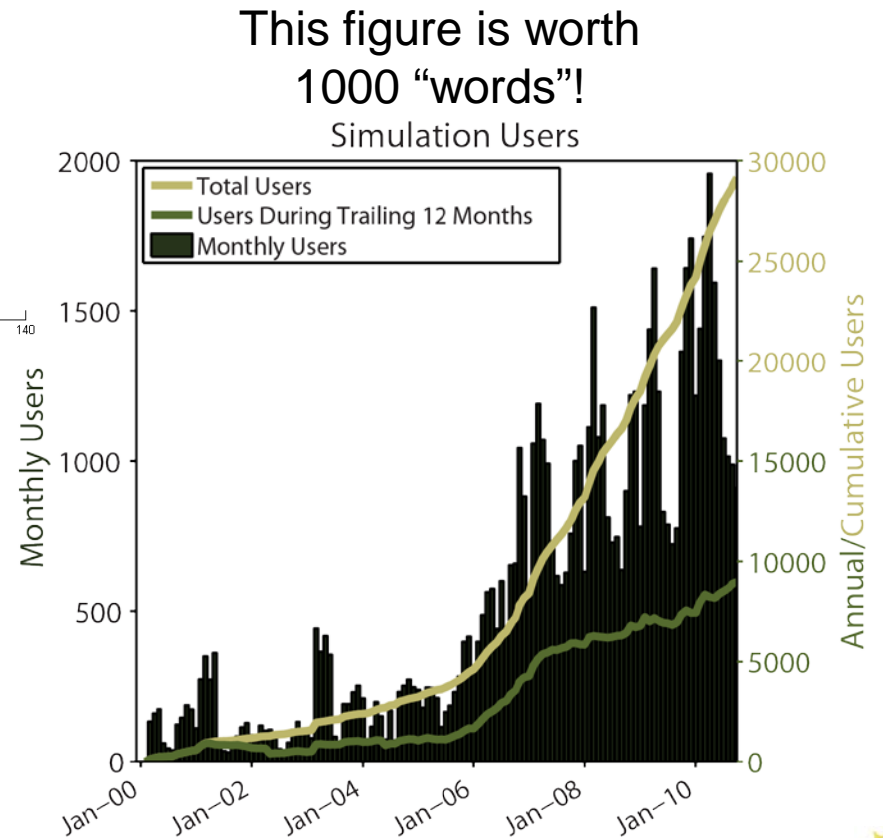
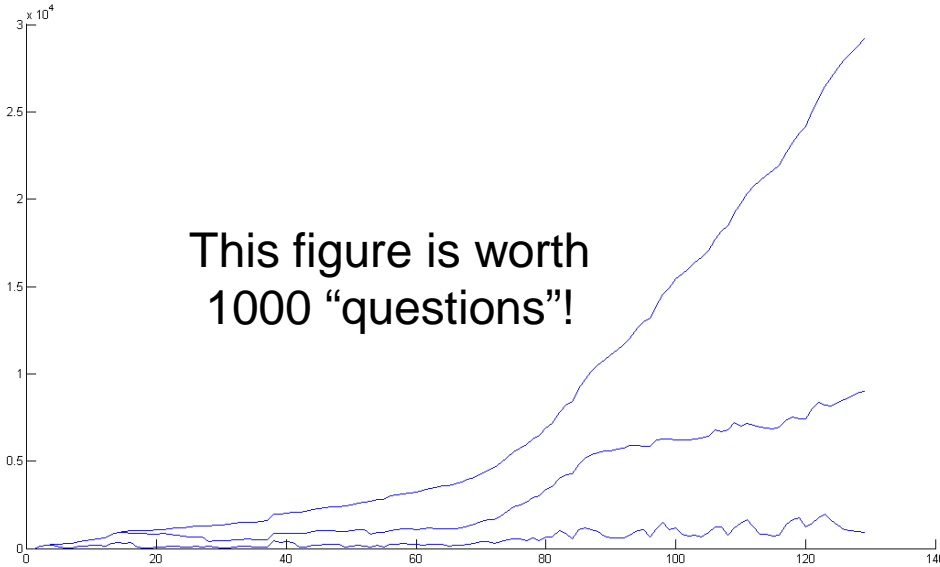
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- Motivation
- What makes a plot?
 - » Types of plots
- Axis
- Dual-axis
- Labels, title and legends
- Color, line width, line type
- Print/export

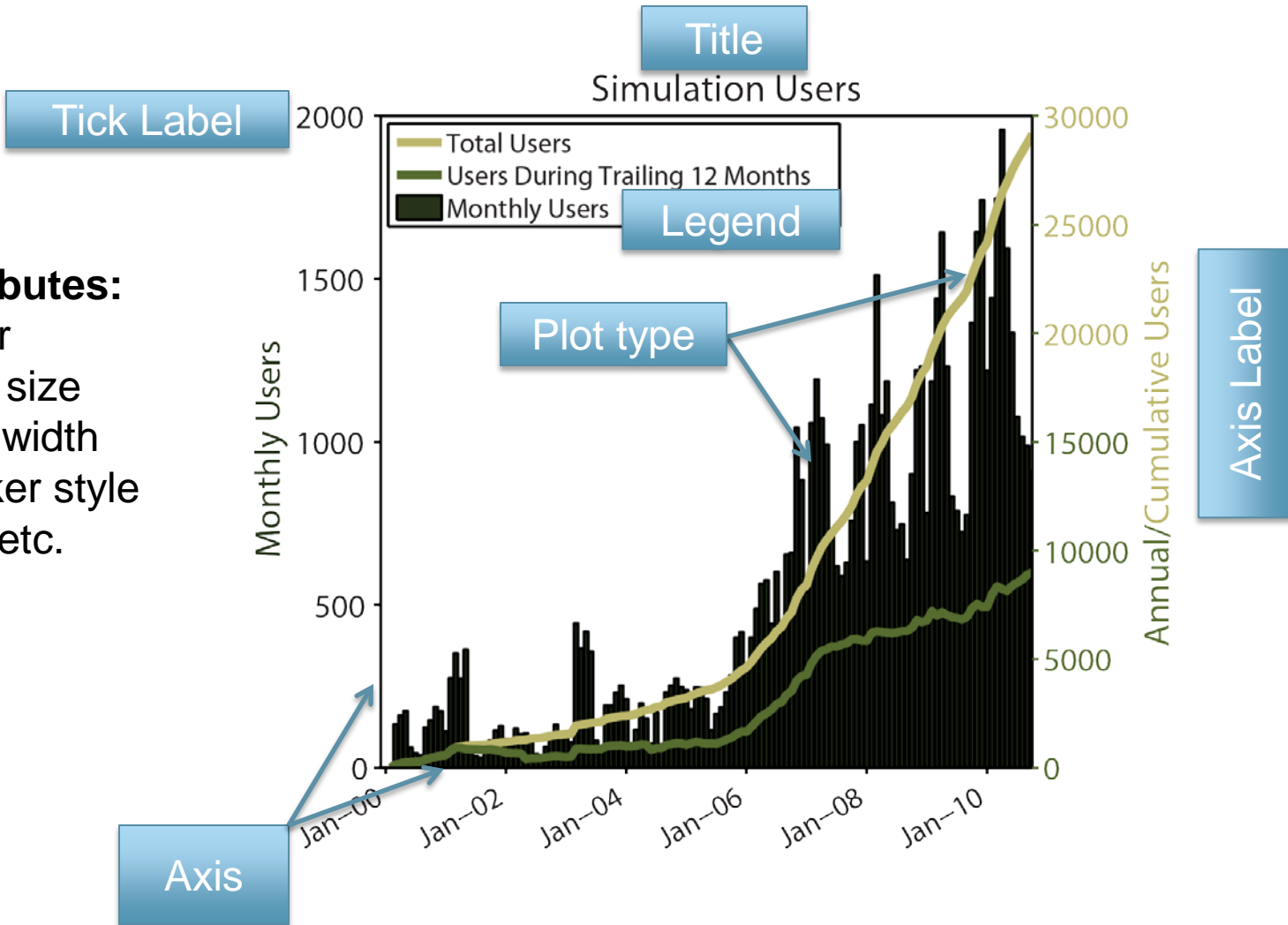




- Why Matlab?
 - » We usually write our [prototype] codes in Matlab®
 - » Powerful
- GNU plot
 - » Pros: powerful
 - » Cons: you should learn it!
- Excel
 - » Pros: powerful
 - » Cons: you should learn how to write scripts!
- Other useful tools:
 - » Adobe Photoshop and Illustrator
 - » MSPaint
 - » GIMP and InkScape

What Makes a Plot?

Attributes:
 Color
 Font size
 Line width
 Marker style
 And etc.

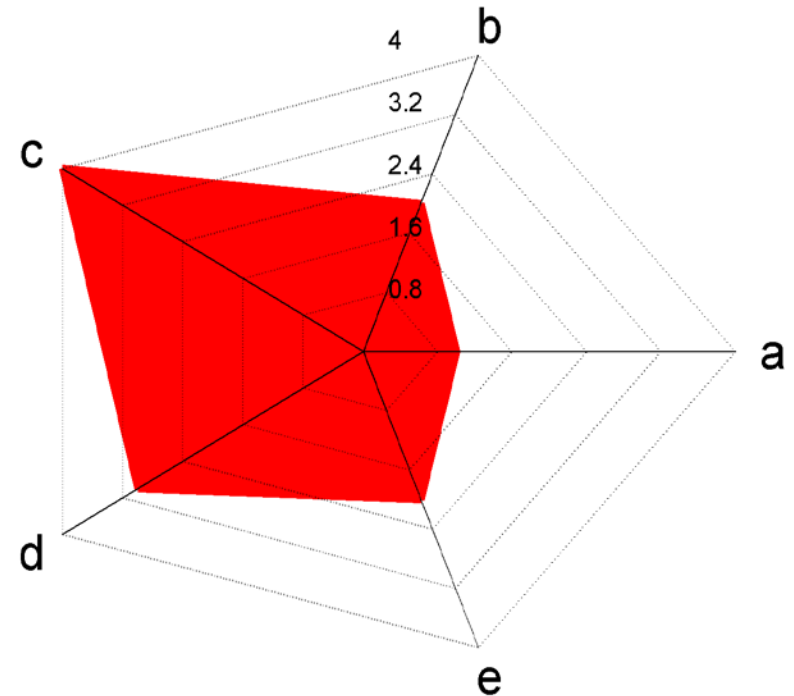


Popular Plots

- Plot
- Scatter
- Bar
- Semilogx, Semilogy, LogLog
- Errorbar
- Contour
- 3D and ...

Custom Plots

- Radar



- `gca = get current axis`
`set(gca,'FontSize',20,'LineWidth',2)`

- box on/off

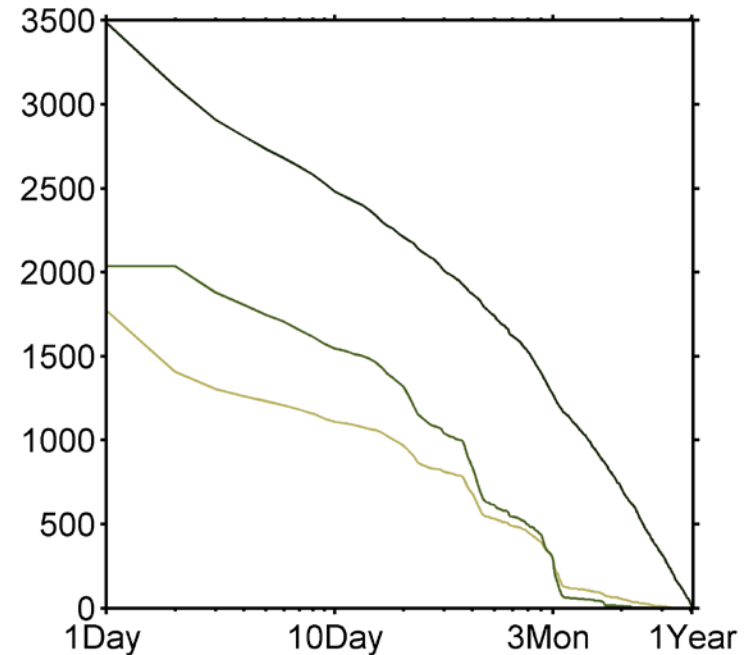
- `axis([x1 x2 y1 y2])`
`» axis([0 370 0 3500])`

- Tickdir in/out
`set(gca,'TickDir','out')`

- axis square
`» axis([AX1 AX2 ...],'square')`

- log/linear
`set(gca, 'XScale', 'log');%YScale and linear`

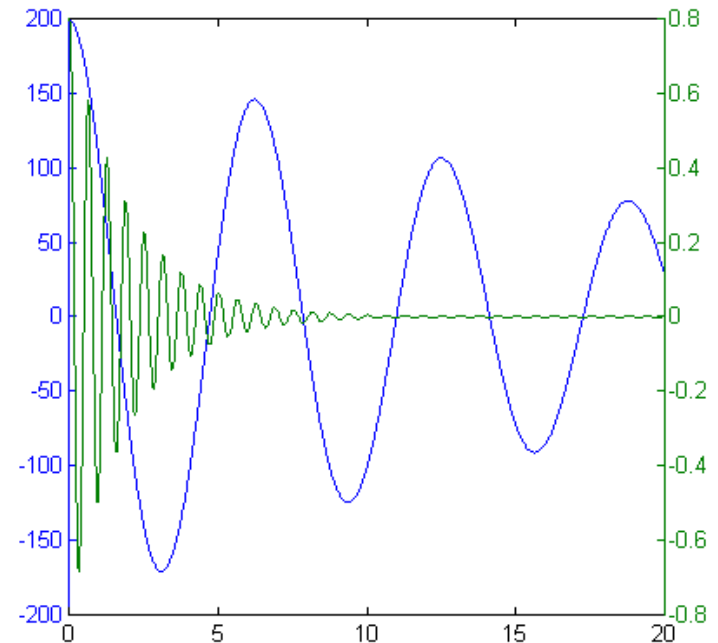
- XTickLabel and XTick
`Xt = [1 10 90 365]; Xlab = ['1Day ','10Day ','3Mon ','1Year'];%;` is very important
`set(gca,'XTick',Xt,'XTickLabel',Xlab);`



Dual-Axis with plotyy

- plotyy
 - » `[AX, H1, H2] = plotyy(X1,Y1,X2,Y2,Fu`
 - AX(1) and AX(2) two axes
 - H1 and H2 handles to first and second
 - Functions like `@semilogy` or `'plot'`

- Example:
 - » `x = 0:0.01:20;`
 - » `y1 = 200*exp(-0.05*x).*cos(x);`
 - » `y2 = 0.8*exp(-0.5*x).*cos(10*x);`
 - » `[AX,H1,H2] = plotyy(x,y1,x,y2,'plot');`
 - » `axis('square');`
 - » `axis([AX(1) AX(2)],'square');`



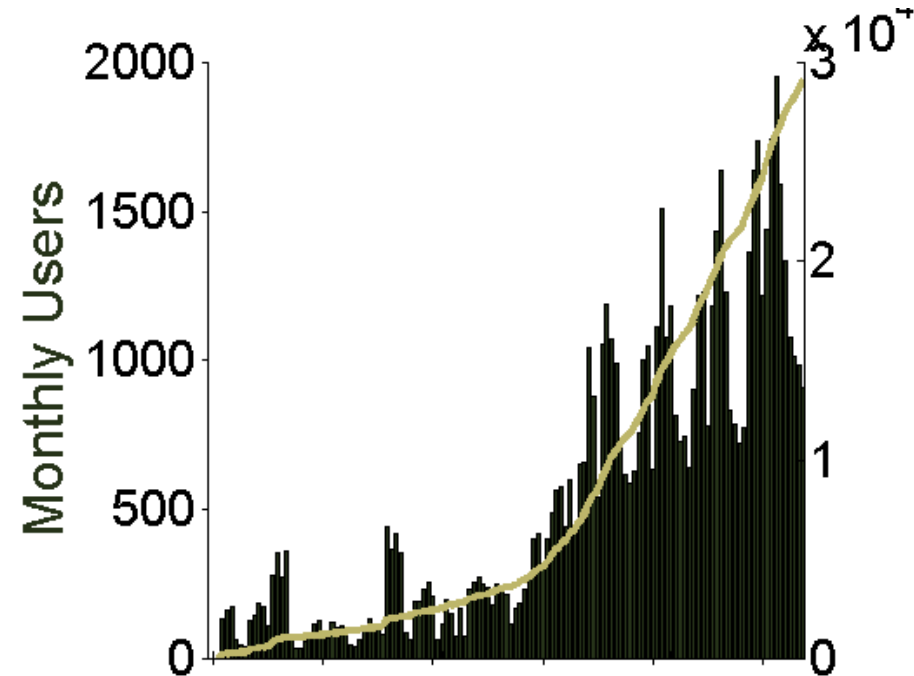
Dual-Axis by adding a new axis

- Adding axis

- » Plot first plot with its setting
- » Add a new axis
- » Plot second one
- » Move Y-axis to right

- Example:

- » `H1 = bar([1:NN],data(1:NN,1),'facecolc`
- » `A1 = gca;`
- » `A2 = axes('Position',get(A1,'Position'));`
- » `B=plot([1:NN],data(1:NN,3),'color',[0.7 0.7 0.4],'LineWidth',3);hold on;`
- » `set(A2,'YAxisLocation','right','Color','none','XTickLabel',[]);`
- » `set(A2,'XLim',get(A1,'XLim'));`



Label, Title and Legend (1)

- Axis label

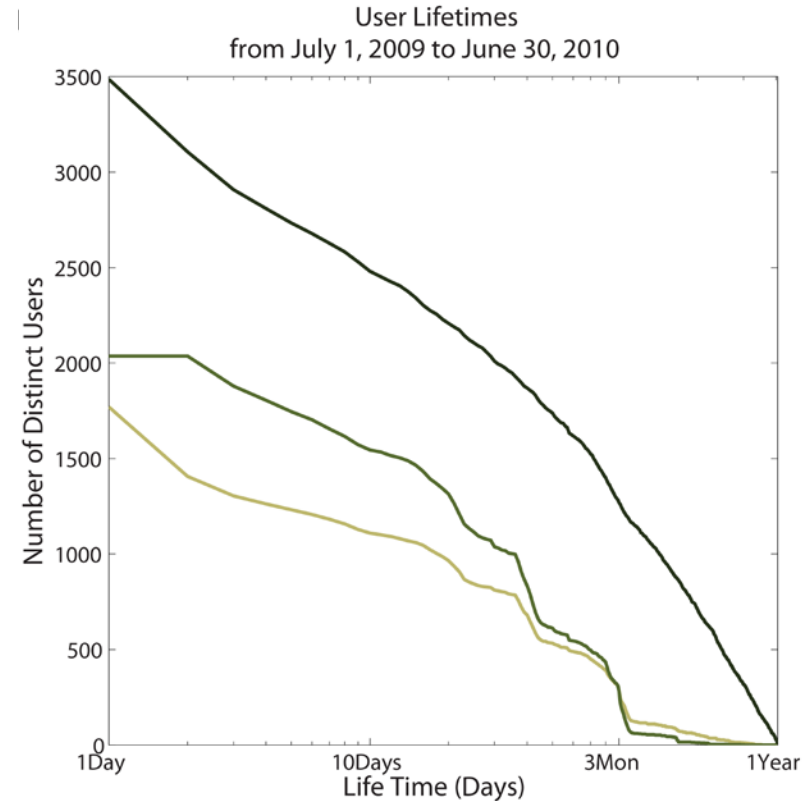
```
h = xlabel('Life Time (Days)');
set(h, 'FontSize', 24)
h=ylabel('Number of Distinct Users',...
'FontSize', 24)
```

```
xlabel(AX,'string', FontSize,Color,rot.)
```

- Title

```
h=title('User Lifetimes from July 1, 2009 to ...
June 30, 2010'); set(h, 'FontSize', 24)
```

```
h=title({'User Lifetimes'; 'from July 1, 2009 to June 30, 2010'},'FontSize', 20)
```



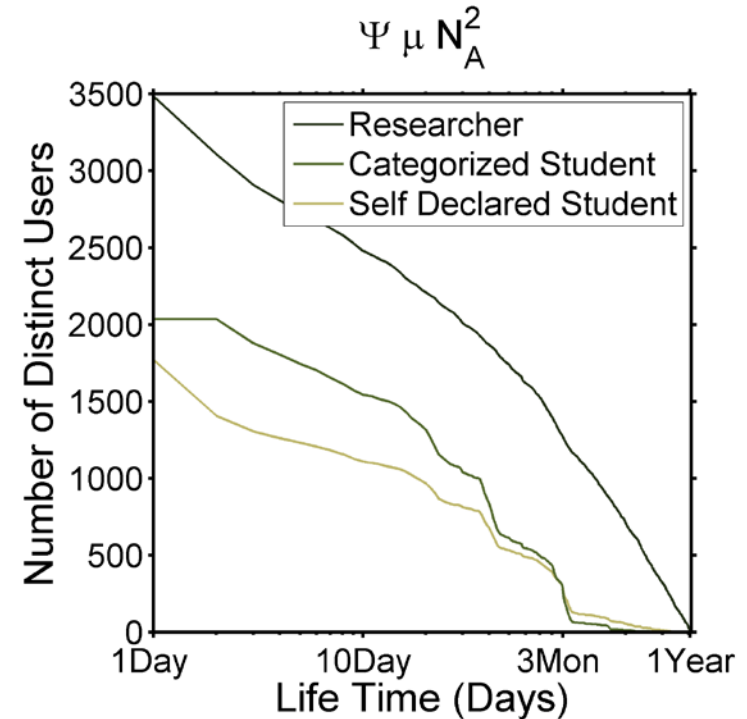
Label, Title and Legend (2)

- Legend

```
h = legend([A B C], 'Researcher', ...
           'Categorized Student', ...
           'Self Declared Student', 1);
set(h, 'FontSize', 20)
```

- Greek characters:

- » `{\ Greek alphabet}` `{\Psi \mu}`
- » `Char_Subscript^Superscript` `N_A^2`



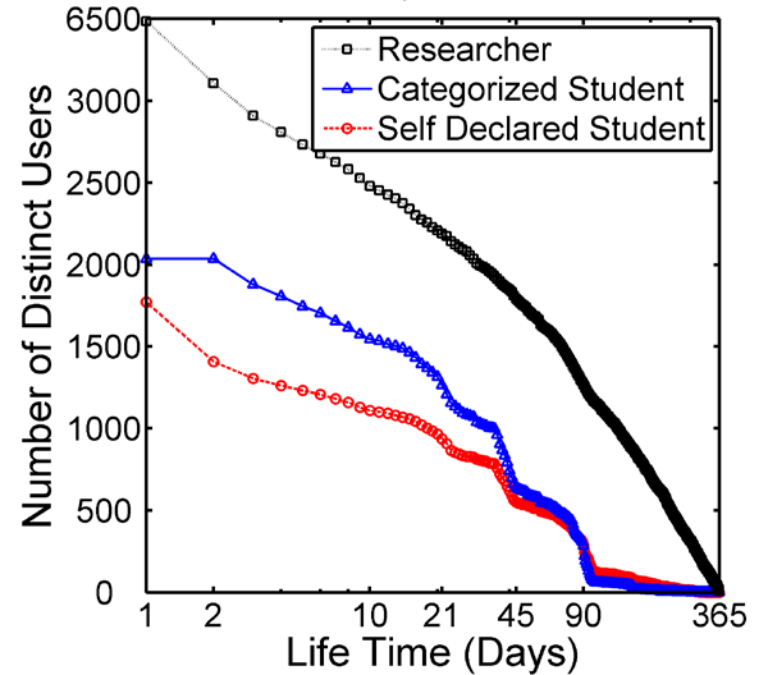
Color, Line Width, Line Style and Marker Type

```
A = plot(X,Y,'r--o','LineWidth',2);
```

- r: color (like r,g,b,k,y,c)
- 'color',[0.9 0.3 0]
 - » [R G B]
- --: line style (like -,--, :,)
- o: Marker type (like o,s,^,v,*)
- LineWidth

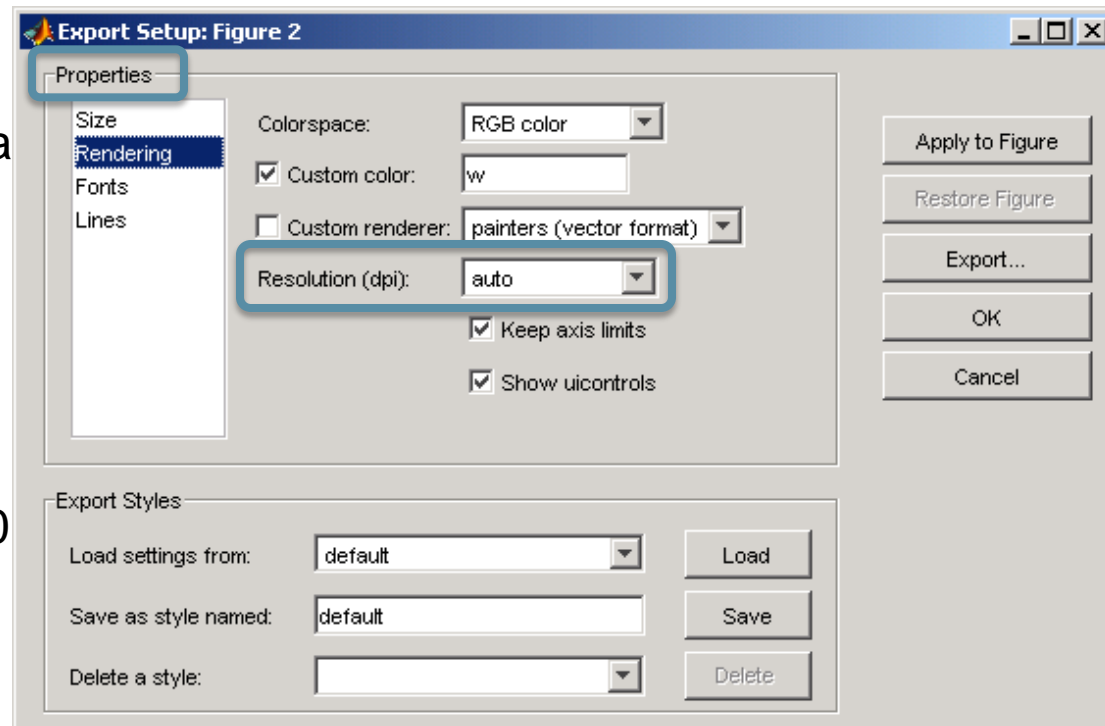
- More control:
 - » 'MarkerFaceColor'
 - » 'MarkerEdgeColor'
 - » 'MarkerSize'

User Lifetimes from July 1, 2009 to June 30, 2010



- DPI (Dot Per Inch)
- Script:
 - » `print(gcf, '-r600', '-dpng', 'FileName')`
 - `gcf`, get current figure
 - `-r600` or `-r300` or `-rXYZ`
 - `-dpng`, `-deps`, `-djpeg` and etc.
 - » `saveas(gcf, 'FileName', 'Format')`

- Manual:
 - » File>Export Setup
 - >Properties>Rendering
 - >Resolution(dpi)>300 or 600



Thanks!