LaTeX basics

How to create publication-quality figures

Tiep Vu

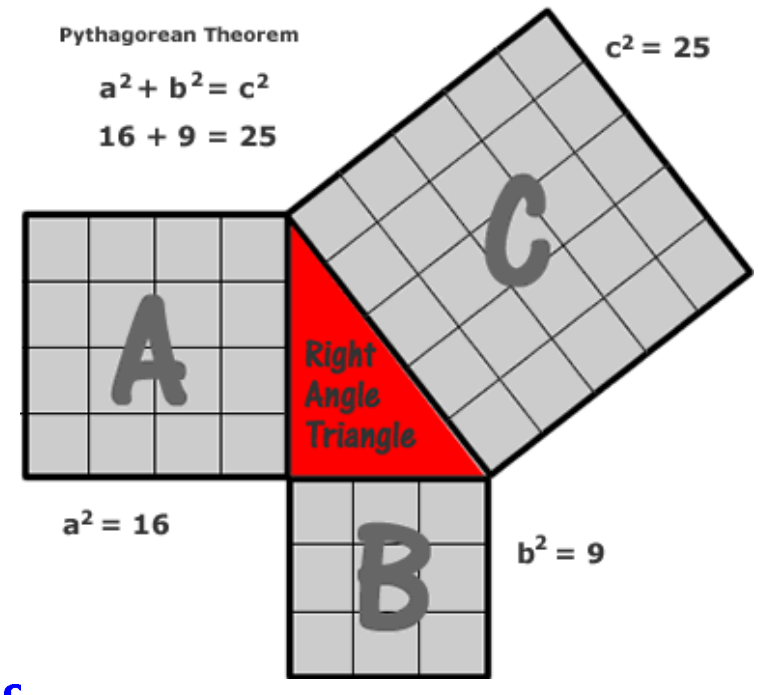
August 2016

Why are figures important?

"A picture is worth a thousand words"

Why are figures important?

- Explain difficult models.
- Visualize your idea.
- Show the results.
- Can be reused in slides and posters
- Readers look at figures first.
- Reflect your respect to your own works.
- ...



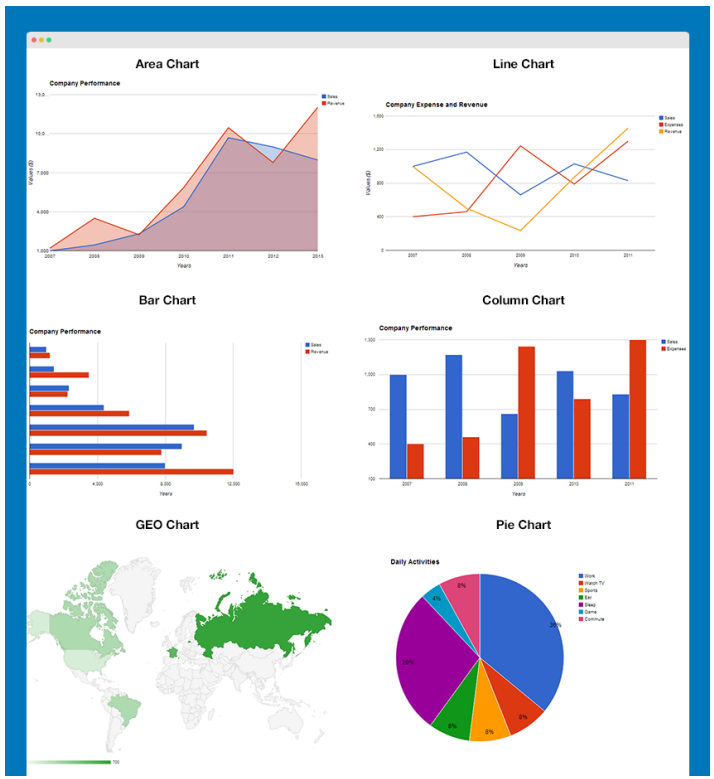
⇒ **Treat graphics as first-class citizens of your papers**

Source: TikZ pgf manual

Important factors on good figures/charts/diagrams

What factors affect figure's quality? (Including but not limited to):

1. Resolution (I prefer vector graphics).
2. Display well on several platforms (phones, computers, projectors, printers).
3. Font size, font family.
4. Consistent with your main texts.
   y = Dx ,$y = Dx, \mathbf{y} = \mathbf{Dx}$.
5. Colors, markers: ●, ■, △.
6. Line thickness: ——— ——.
7. Labels, legends, captions.
8. File size (not too big).
9. No distracted information.



Font family

Serif font (e.g. Time Roman)

The quick brown fox jumps over the lazy dog.

- Good for:
  - Paragraphs,
  - Prints.
- Bad for:
  - Labeling,
  - Short strings of text,
  - Slides or posters.

Sans-serif (e.g. Arial)

The quick brown fox jumps over the lazy dog.

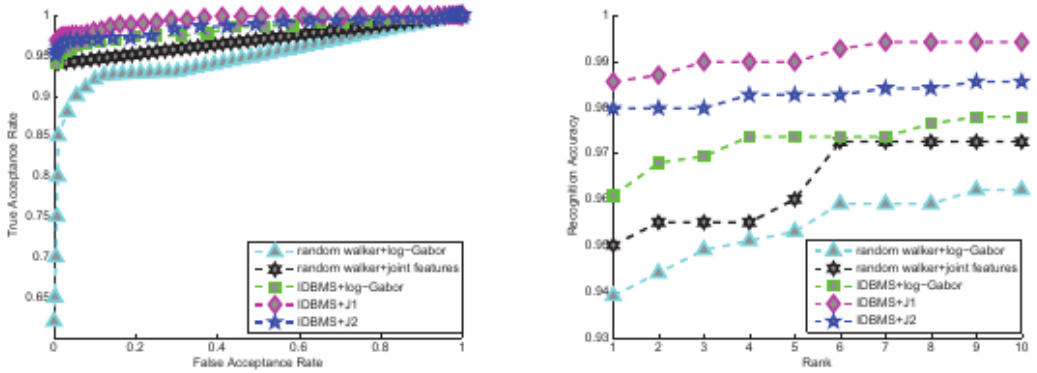
- Good for:
  - Labeling,
  - Short string of text,
  - Projector.

  $\Rightarrow$ good for figures.
- Bad for:
  - Paragraphs.

Don't use rare f■nts.

Font size

IDBMS+J1 even achieves an improvement of 3.8% than the best known method [26] on the rank-one accuracy.

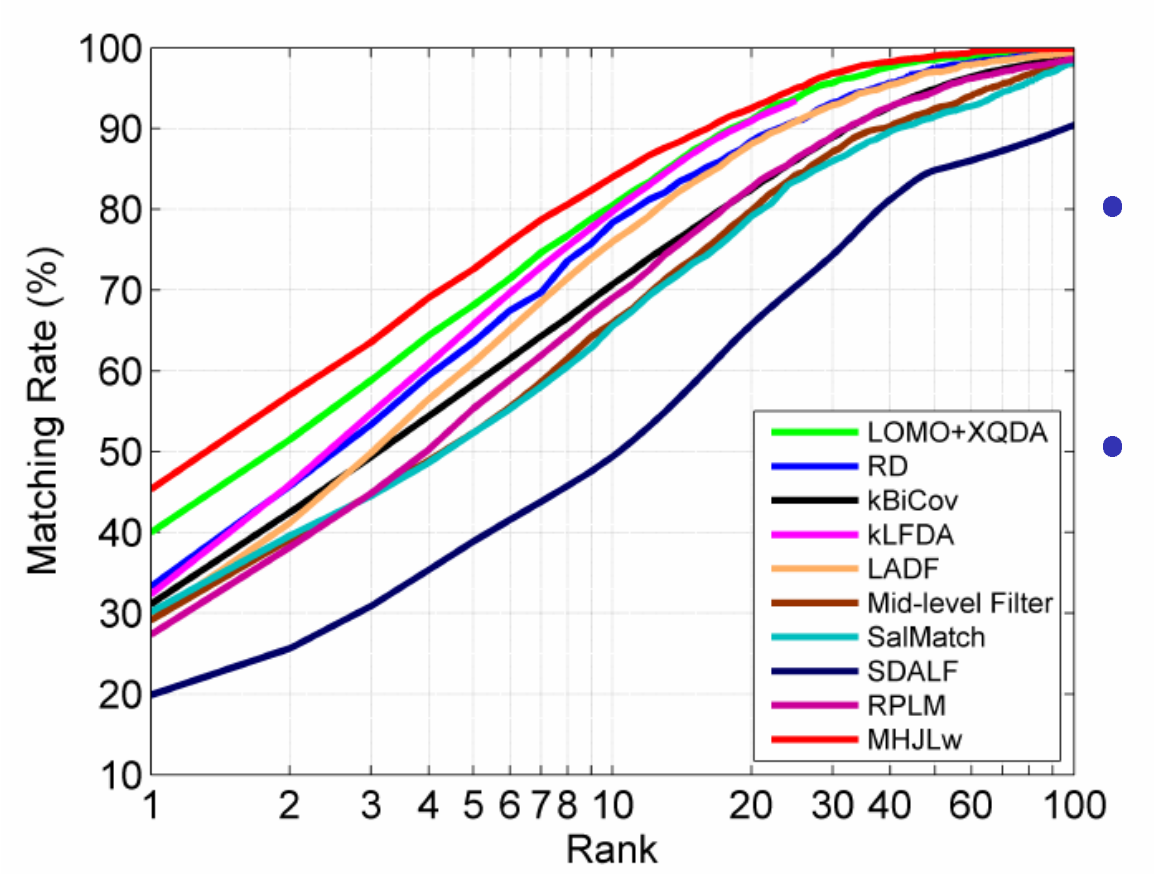


(a) (b)

Fig. 8. The comparison results of five competitive methods. (a) The ROC curves; (b) The CMC curves.

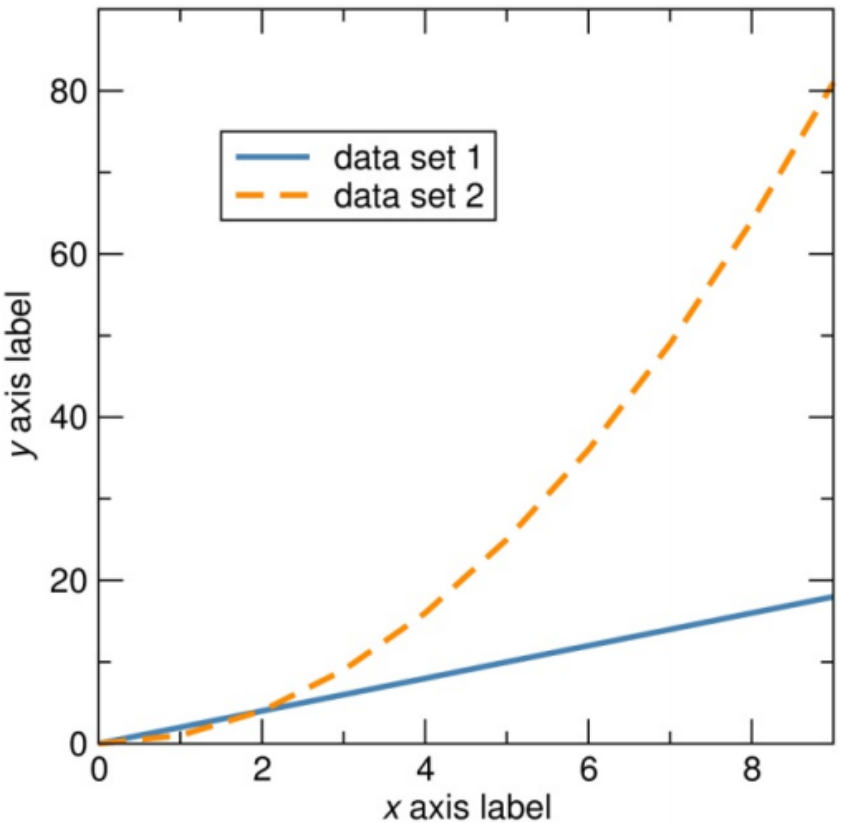
Text in figure is too small compared to the caption and main text.

Colors, markers



- Colors look similar (not good for black-white print, colorblind people)
- Should choose different markers (●, □, ■, △) for each line.

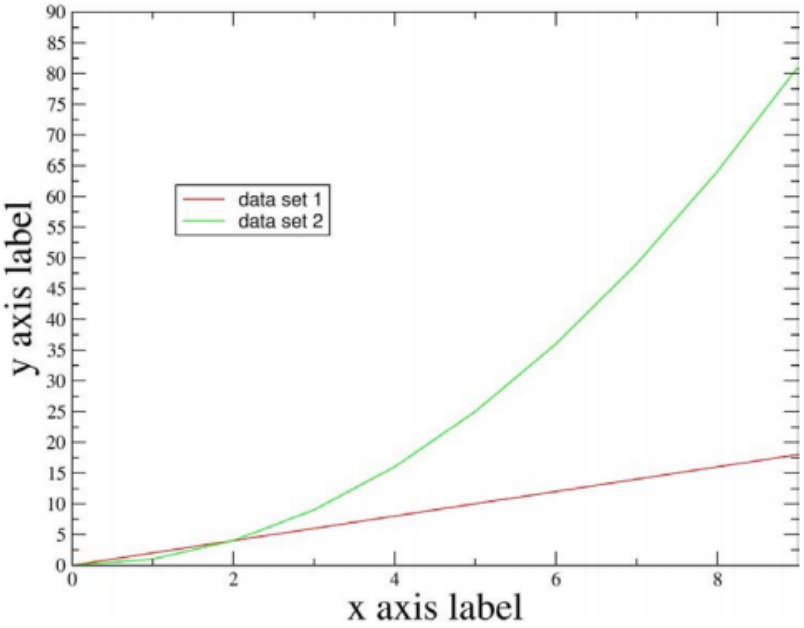
A good plot



- Good ratio of font size (in ticks, labels, legends).
- Good choice of color.
- Good choice of line type (dashed, solid).

Source: Preparing figures for publication and presentations.

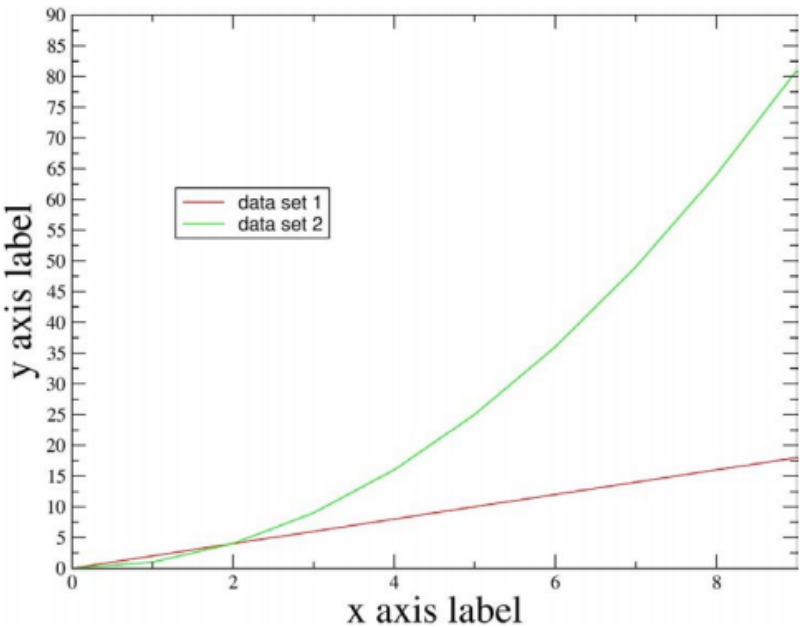
A bad plot



- Good ratio of font size (in ticks, labels, legends).
- Good choice of color.
- Good choice of line type (dashed, solid).

Source: Preparing figures for publication and presentations.

Color selection



- Different font size/family in labels, legends and ticks.
- Redundant ticks.
- Bad choice of colors and line type.

Another good plot

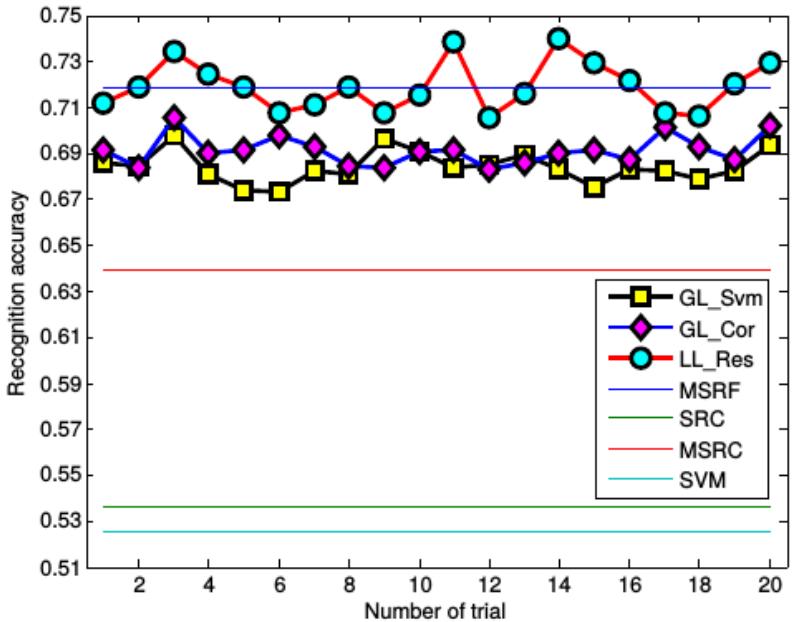
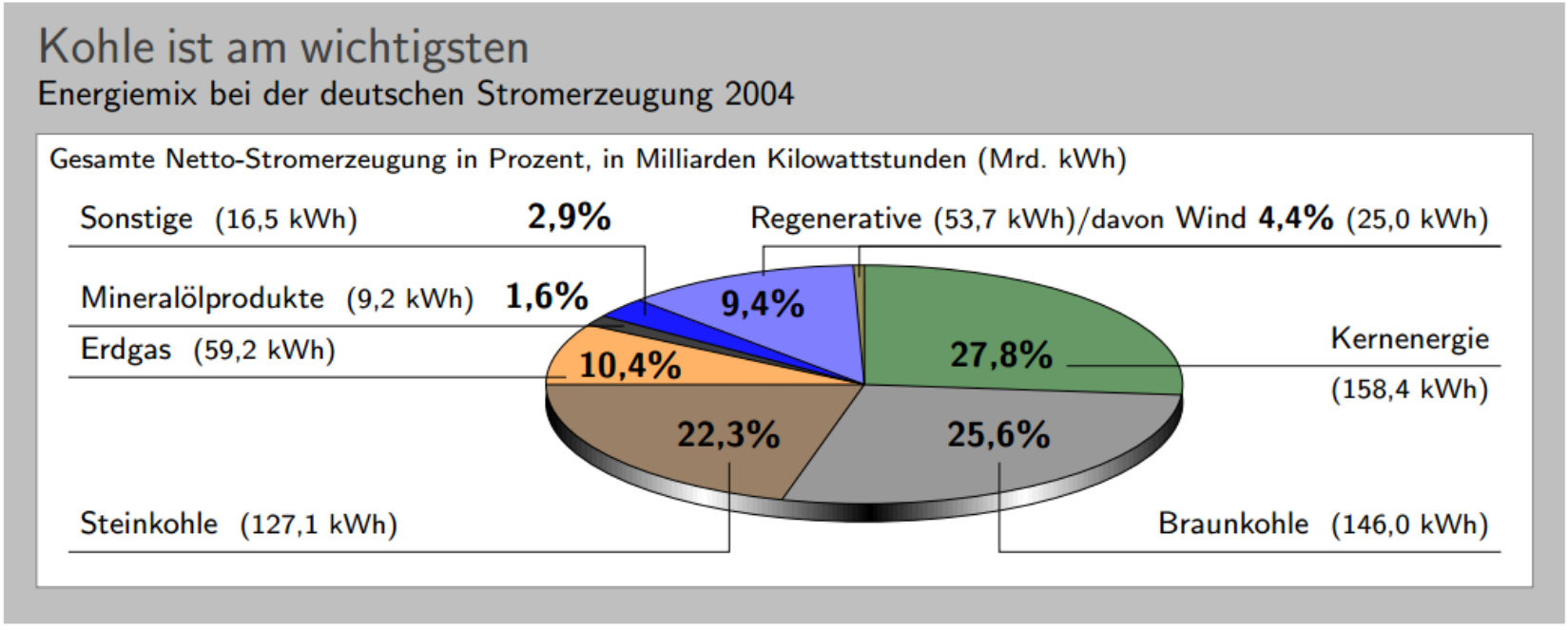


Fig. 6. The recognition performance on articulation and occlusion.

- Font size/family
- Markers, line thickness, Colors
- Focus on main methods.

Don't abuse 3D figures



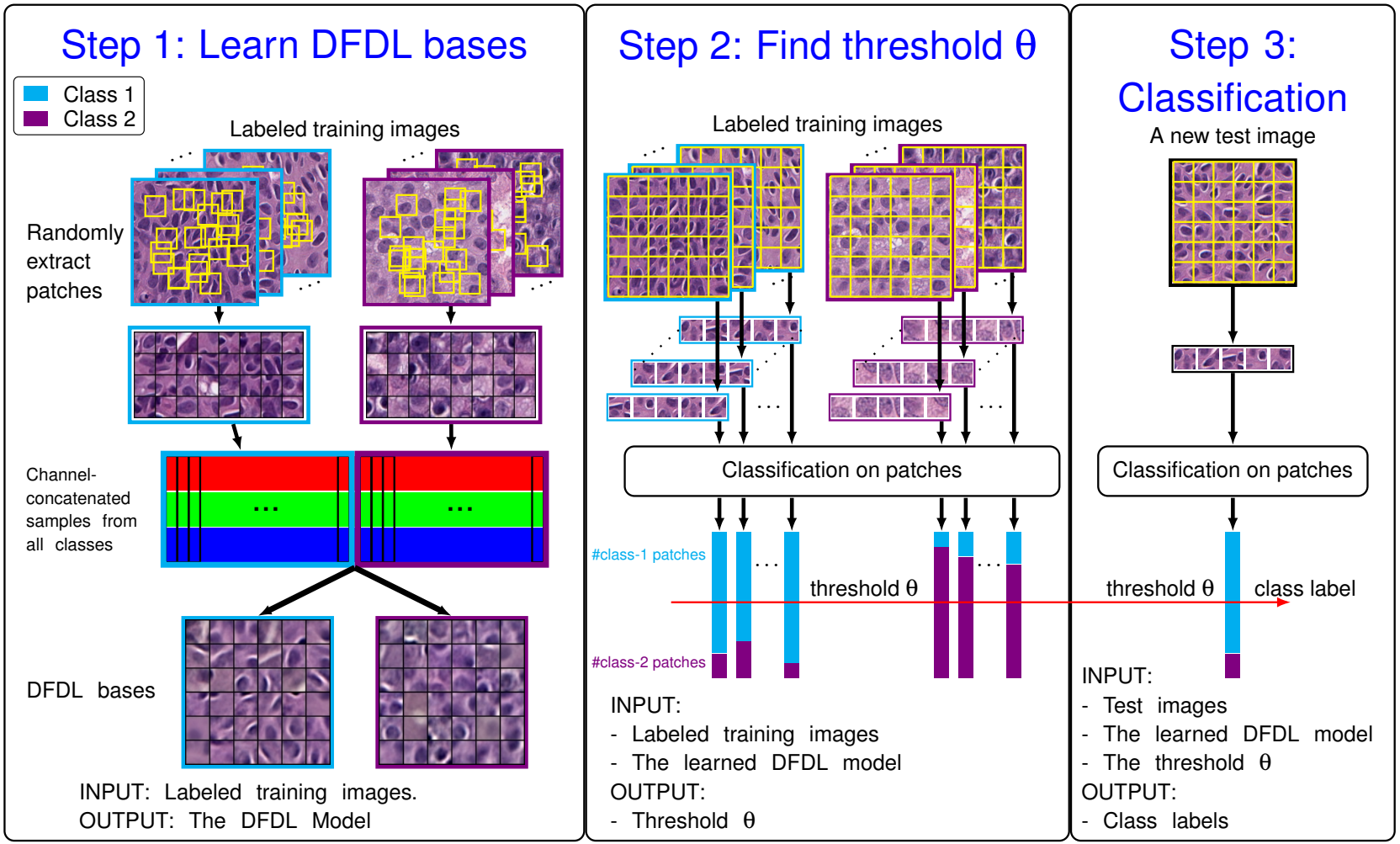
- Smaller parts look bigger and vice verse (3D-distorted proportions).
- Color choice (do not apply color randomly).
- The shadings add nothing "information-wise"

Source: TikZ and pgf Manual

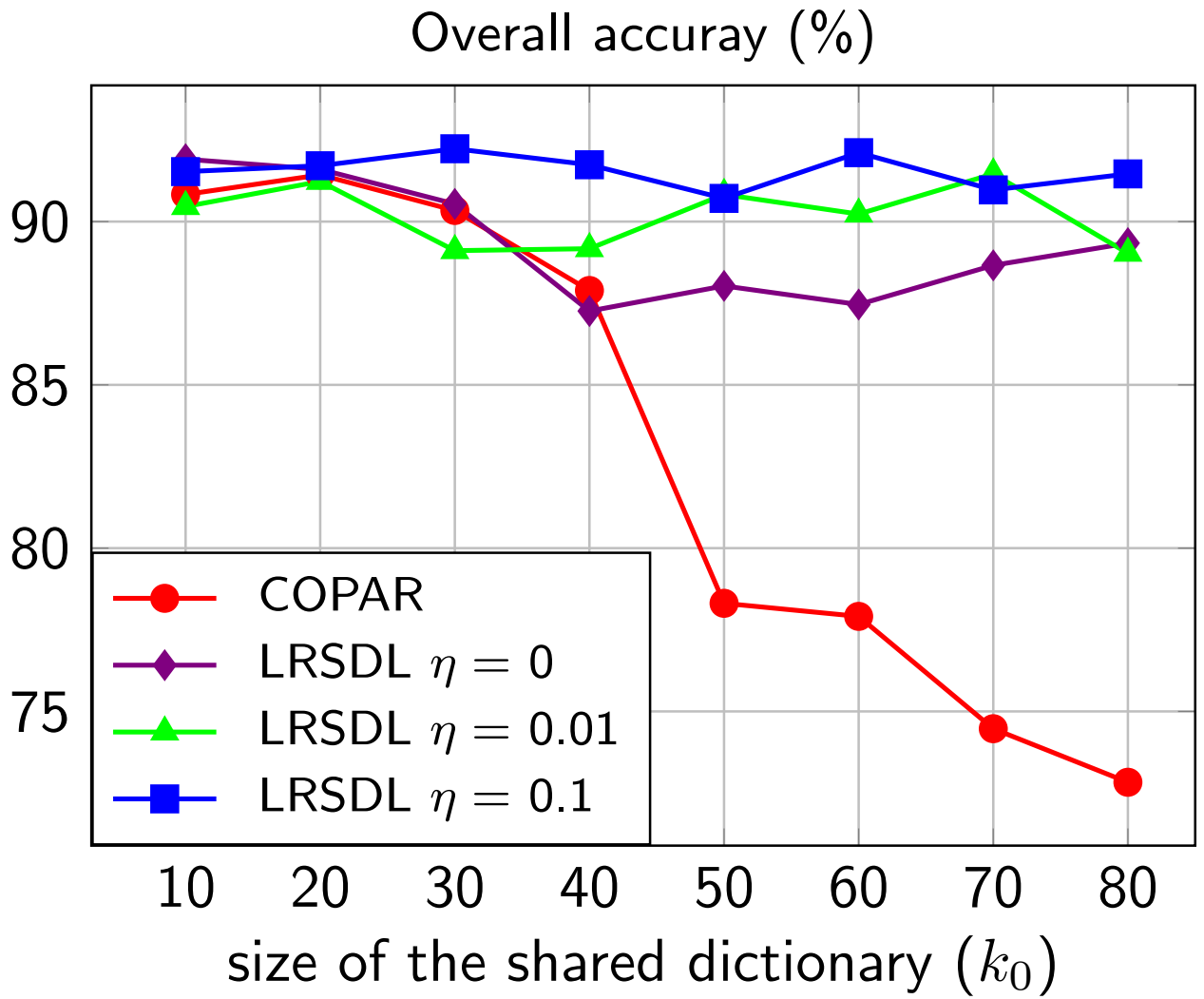
Softwares for generating good figures

- MS Office Excel, Visio.
- MATLAB.
- R (a programming language).
- matplotlib (a Python package for plotting).
- ImageJ
- GeoGebra
- Inkscape
- TikZ and pgfplot (a package in LaTeX).
  - Free, lightweight, no need more installation if you have LaTeX
  - Highly Customizable.
  - Takes time to generate figures, but figures are easily edited later (in any text editor).
  - Generate vector-graphic, small-file-size figures.

Some TikZ examples



Some TikZ examples



References

- TikZ and pgf Manual
- Preparing figures for publication and presentations. (Ram Seshadri, UCSB).
- 10 simple rules for better figures

Thanks for watching