Schöne Grafiken mit TikZ - A Beginner's Guide

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Overview

What is TikZ and what is it good for?

TikZ — TikZ ist kein Zeichenprogramm

- LaTeX / PGF-based drawing framework
- program your graphics instead of using annoying UI-based tools
- Ti*k*Z either integrates into your document or creates stand-alone vector graphics.

Pros and Cons

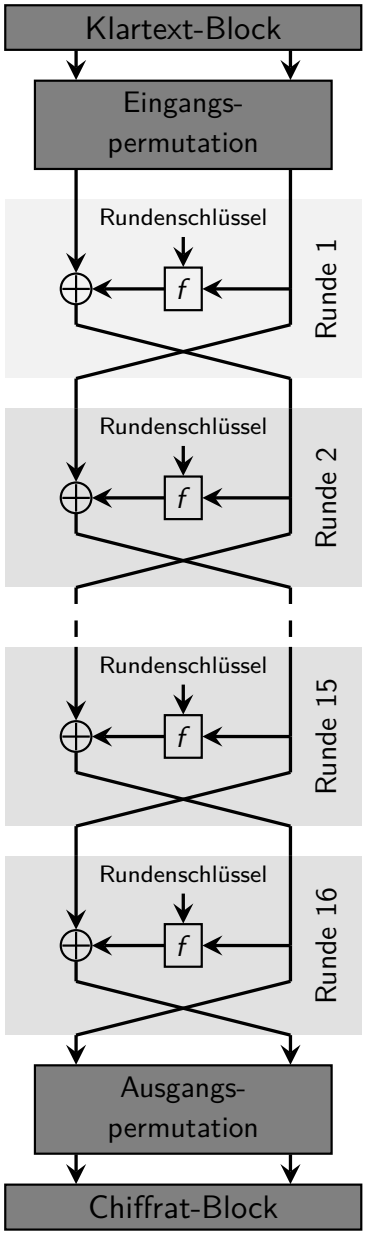
Pros

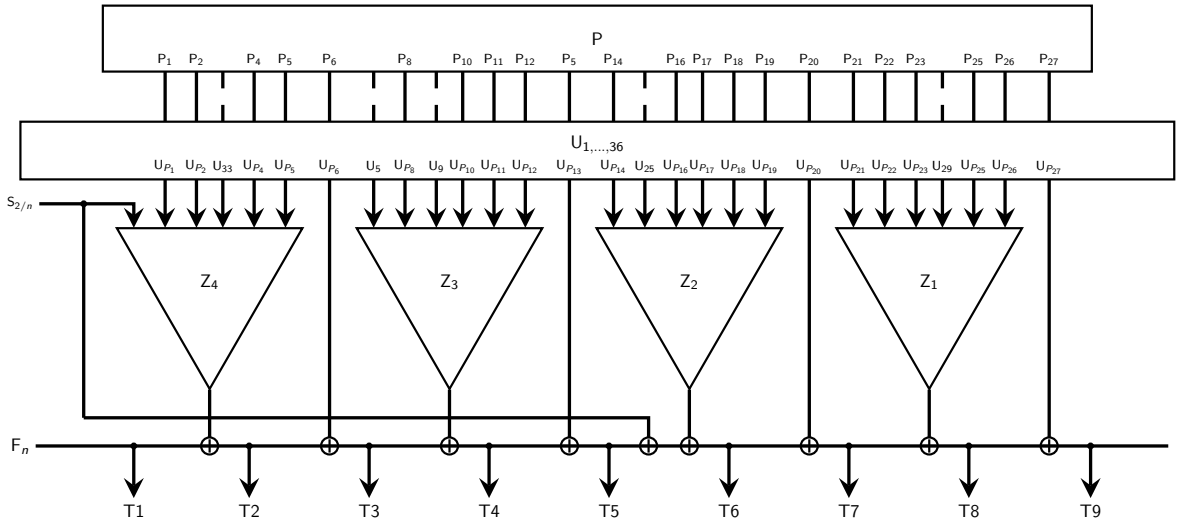
- Integrates seamlessly into LaTeXdocuments
- Sharp, precise vector graphics
- Usage of variables, loops and other programming stuff
- Easily version controllable (git)

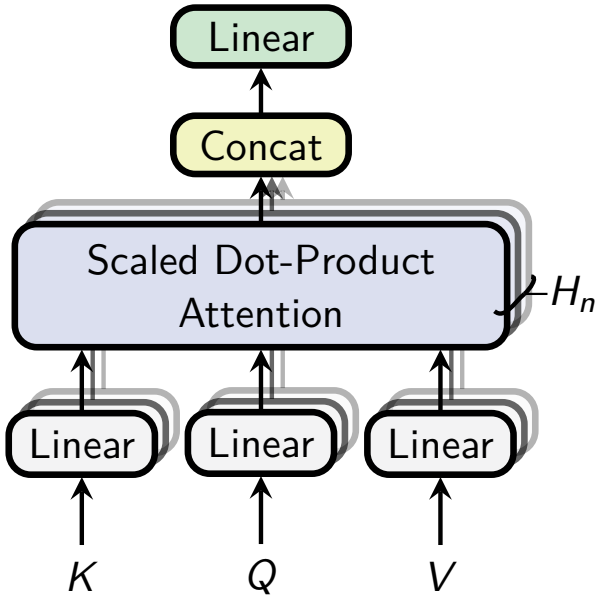
Cons

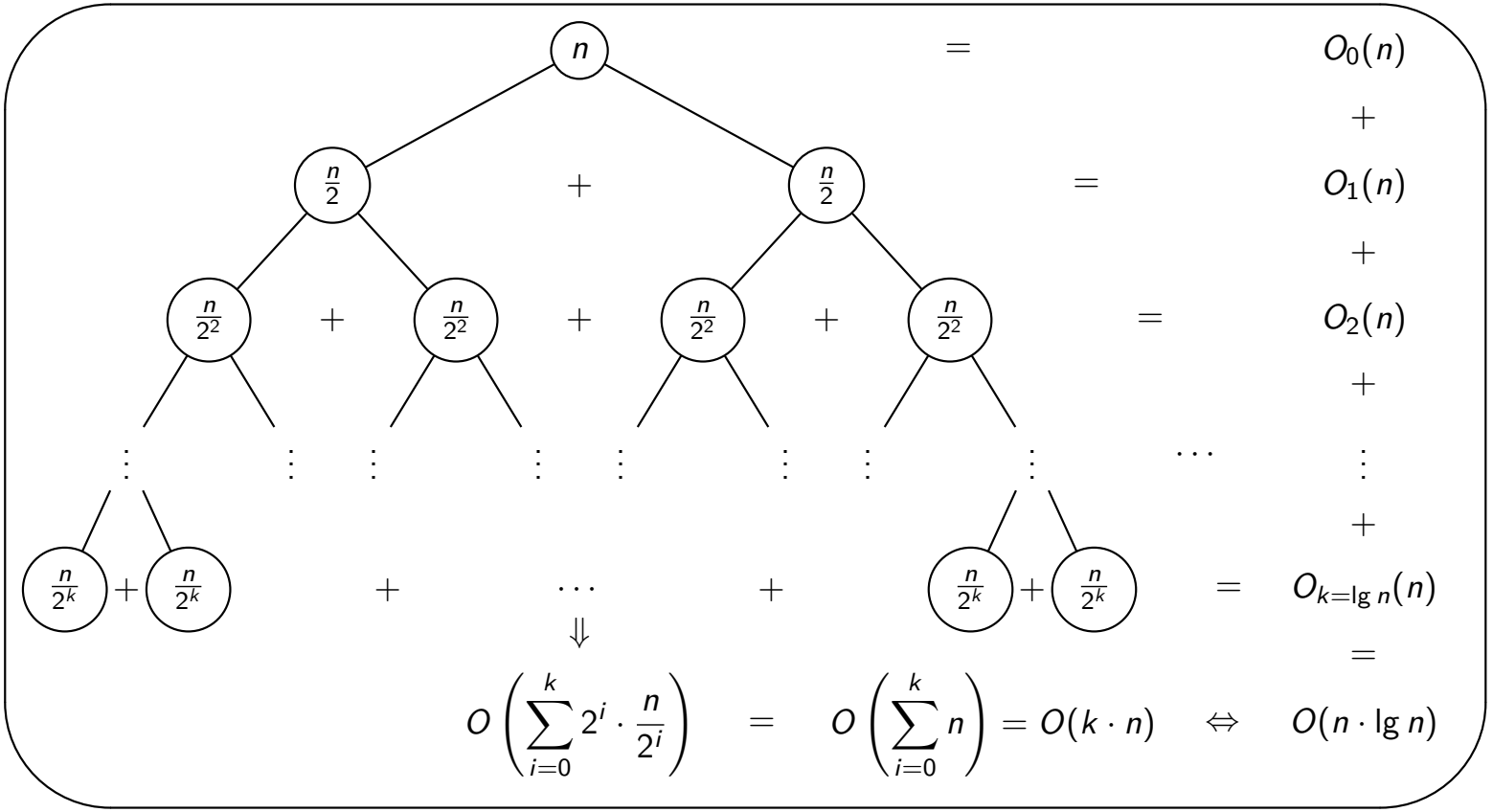
- Steep learning curve
- drawing takes time
- May become confusing for larger graphics

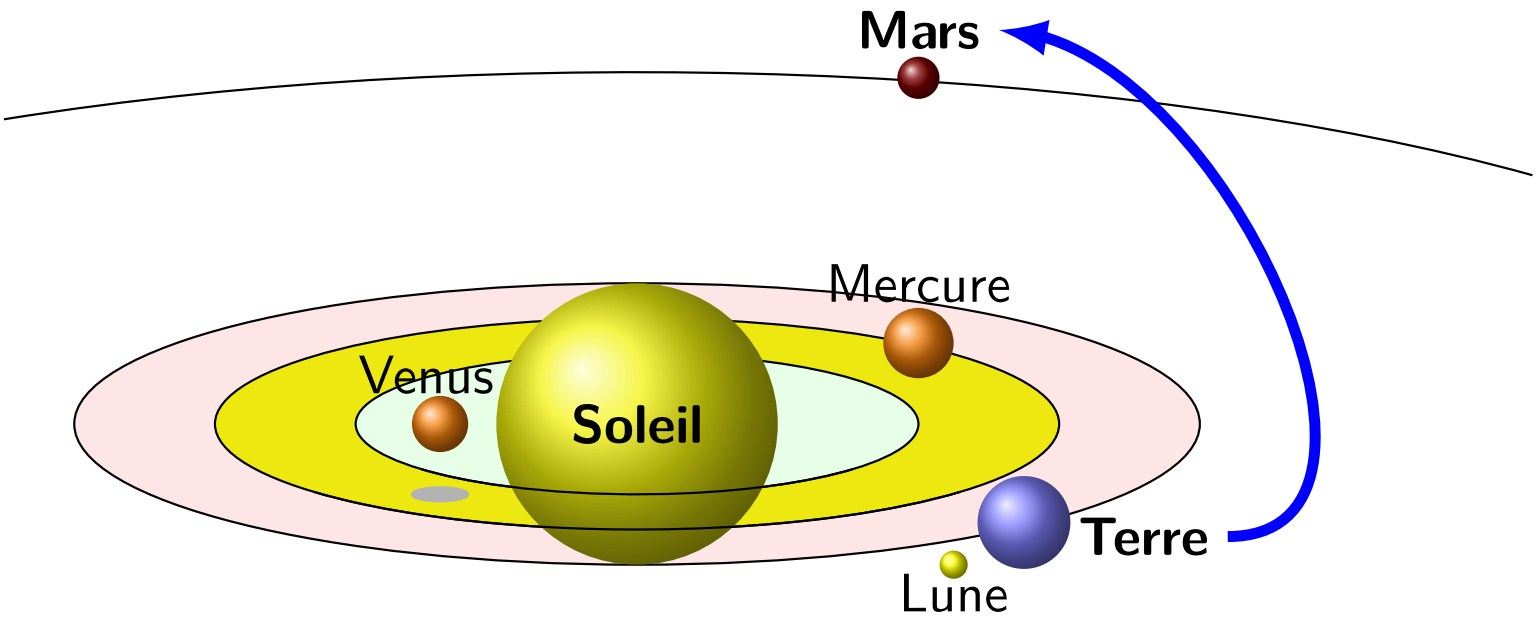
Examples


Klartext-Block
Eingangs-
permutation
Rundenschlüssel
f
Runde 1
Rundenschlüssel
f
Runde 2
Rundenschlüssel
f
Runde 15
Rundenschlüssel
f
Runde 16
Ausgangs-
permutation
Chiffrat-Block


P
U1,...,36
S2/n
Z4
Z3
Z2
Z1
Fn
T1
T2
T3
T4
T5
T6
T7
T8
T9


Linear
Concat
Scaled Dot-Product
Attention
Hn
Linear
Linear
Linear
K
Q
V


n = $O_0(n)$
+
$\frac{n}{2}$ + $\frac{n}{2}$ = $O_1(n)$
+
$\frac{n}{2^2}$ + $\frac{n}{2^2}$ + $\frac{n}{2^2}$ + $\frac{n}{2^2}$ = $O_2(n)$
+
$\cdots$ $\vdots$
+
$\frac{n}{2^k} + \frac{n}{2^k}$ + $\cdots$ + $\frac{n}{2^k} + \frac{n}{2^k}$ = $O_{k=\lg n}(n)$
=
$\Downarrow$
$O\left(\sum_{i=0}^{k} 2^i \cdot \frac{n}{2^i}\right)$ = $O\left(\sum_{i=0}^{k} n\right) = O(k \cdot n)$ $\Leftrightarrow$ $O(n \cdot \lg n)$


Mars
Mercure
Venus
Soleil
Terre
Lune

When and when not to use

- Flowcharts
- Trees
- Schematic representations
- Annotate/draw over existing images
- Bonus (Whatever libraries there may be) - many scientific packages.

When not to use...

- Plots and charts (use PGPlot, matplotlib or any other plotting library)
- Quick Drafts
- Art, Fancy stuff?

Setup ()

LaTeXenvironment

- Most LaTeXdistributions include Ti*k*Z
- May require install on certain distributions
  1. Miktek: Open Miktek Console → Packages → Install package tikz
  2. Others: Please let google help you
- Online-Editors like Overleaf usually support out-of-the-box

Preamble

```
\usepackage{tikz}
\usetikzlibrary{tikz.positioning}
```

Create a TikZ image

inline

```
\begin{figure}
  \begin{tikzpicture}[options]
    ...
  \end{tikzpicture}
\end{figure}
```

---

separate file

```
\begin{figure}
  \include{images/separate_image_tex_file}
\end{figure}
```

Let's start with nodes!

Go to guide/00_basics/00_node_basics and open the tex file.
Alternatively go to Overleaf and do the same

Another basic command: draw

Go to guide/00_basics/01_draw_basics and open the tex file.
Alternatively go to Overleaf and do the same

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Go to guide/00_basics/01_draw_basics and open the tex file.
Alternatively go to Overleaf and do the same

Theorem

Theorem (Mass–energy equivalence)

$E = mc^2$

Verbatim

Example (Theorem Slide Code)

```
\begin{frame}
\frametitle{Theorem}
\begin{theorem}[Mass--energy equivalence]
$E = mc^2$
\end{theorem}
\end{frame}
```

Figure

Uncomment the code on this slide to include your own image from the same directory as the template .TeX file.

Citation

An example of the `\cite` command to cite within the presentation:

This statement requires citation [Smith, 2012].

References

John Smith (2012)

Title of the publication

Journal Name 12(3), 45 – 678.

The End