

Visual assessments of Postural Orientation Errors using ensembles of Deep Neural Networks



Master's Thesis

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Agenda

1. Introduction
2. Methods
3. Results
4. Conclusions and Future work
5. Titleformats
6. Elements
7. Conclusion

Introduction

Sports injuries

50% of amateur football players in Denmark experience hip/groin pain during season¹.

Around 8000 yearly Anterior cruciate ligament injuries in Sweden².

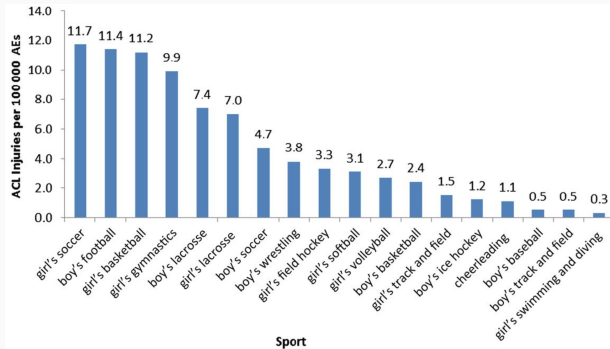


Figure 1: Injury rates among high school students, per 100 000 athlete exposures³.

¹Thorborg et al., Prevalence and severity of hip and groin pain in sub-elite male football: a cross-sectional cohort study of 695 players. 2017

²Svenska kortsbandsregistret, Årsrapport 2019. 2020

³LaBella et al., Anterior Cruciate Ligament Injuries: Diagnosis, Treatment, and Prevention. 2014

Anterior cruciate ligament injury and rehabilitation

- Regular injury mechanism is sudden changes in direction or velocity while knee is bearing weight⁴.
- Rehabilitation typically up to 2 years⁵.
- Increased long and short term risk of, e.g., osteoarthritis⁶, joint instability⁷, and re-injury⁸.

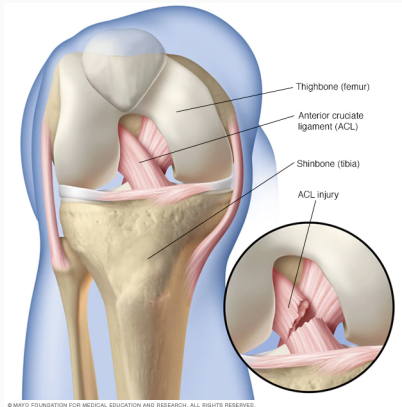


Figure 2: Illustration of ACL in the knee⁹.

⁴Wetters et al., Mechanism of Injury and Risk Factors for Anterior Cruciate Ligament Injury. 2016

⁵Nagelli and Hewett, Should Return to Sport be Delayed Until 2 Years After Anterior Cruciate Ligament Reconstruction? Biological and Functional Considerations. 2017

⁶Mayo Clinic, <https://www.mayoclinic.org/diseases-conditions/acl-injury/symptoms-causes/syc-20350738>

⁷Wetters et al., Mechanism of Injury and Risk Factors for Anterior Cruciate Ligament Injury. 2016

⁸Nagelli and Hewett, Should Return to Sport be Delayed Until 2 Years After Anterior Cruciate Ligament Reconstruction? Biological and Functional Considerations. 2017

⁹Mayo Clinic, <https://www.mayoclinic.org/diseases-conditions/acl-injury/symptoms-causes/syc-20350738>

Postural Orientation Errors



Figure 3: Examples of maintained (left) and altered postural orientation (right) during a single leg squat.

Methods

Results

Conclusions and Future work

The **METROPOLIS** theme is a Beamer theme with minimal visual noise inspired by the HSRM Beamer Theme by Benjamin Weiss.

Enable the theme by loading

```
\documentclass{beamer}  
\usetheme{metropolis}
```

Note, that you have to have Mozilla's *Fira Sans* font and XeTeX installed to enjoy this wonderful typography.

Sections group slides of the same topic

```
\section{Elements}
```

for which **METROPOLIS** provides a nice progress indicator ...

Titleformats

METROPOLIS supports 4 different titleformats:

- Regular
- SMALLCAPS
- ALLSMALLCAPS
- ALLCAPS

They can either be set at once for every title type or individually.

This frame uses the `smallcaps` titleformat.

Potential Problems

Be aware, that not every font supports small caps. If for example you typeset your presentation with pdfTeX and the Computer Modern Sans Serif font, every text in smallcaps will be typeset with the Computer Modern Serif font instead.

This frame uses the `allsmallcaps` titleformat.

Potential problems

As this titleformat also uses smallcaps you face the same problems as with the `smallcaps` titleformat. Additionally this format can cause some other problems. Please refer to the documentation if you consider using it.

As a rule of thumb: Just use it for plaintext-only titles.

This frame uses the `allcaps` titleformat.

Potential Problems

This titleformat is not as problematic as the `allsmallcaps` format, but basically suffers from the same deficiencies. So please have a look at the documentation if you want to use it.

Elements

The theme provides sensible defaults to
`\emph{emphasize}` text, `\alert{accent}` parts
or show `\textbf{bold}` results.

becomes

The theme provides sensible defaults to *emphasize* text, **accent** parts
or show **bold** results.

Font feature test

- Regular
- *Italic*
- SMALLCAPS
- **Bold**
- ***Bold Italic***
- **BOLD SMALLCAPS**
- Monospace
- Monospace *Italic*
- **Monospace Bold**
- Monospace **Bold Italic**

Items

- Milk
- Eggs
- Potatos

Enumerations

1. First,
2. Second and
3. Last.

Descriptions

PowerPoint Meeh.
Beamer Yeeeha.

- This is important

- This is important
- Now this

- This is important
- Now this
- And now this

- This is really important
- Now this
- And now this

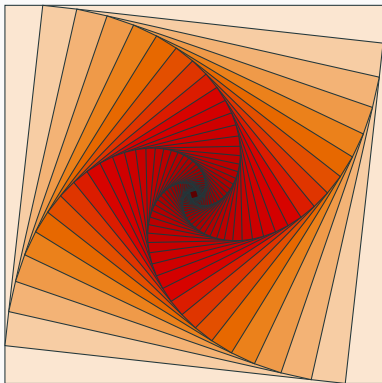


Figure 1: Rotated square from texample.net.

Table 1: Largest cities in the world (source: Wikipedia)

City	Population
Mexico City	20,116,842
Shanghai	19,210,000
Peking	15,796,450
Istanbul	14,160,467

Blocks

Three different block environments are pre-defined and may be styled with an optional background color.

Default

Block content.

Alert

Block content.

Example

Block content.

Default

Block content.

Alert

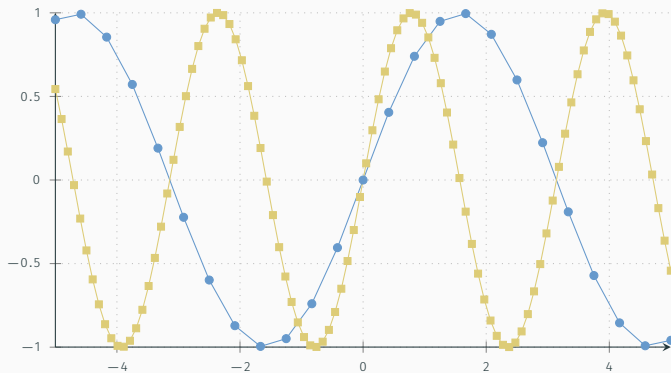
Block content.

Example

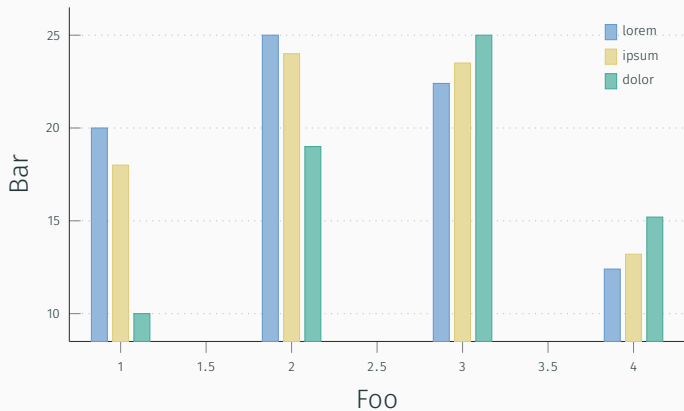
Block content.

$$e = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$$

Line plots



Bar charts



Veni, Vidi, Vici

METROPOLIS defines a custom beamer template to add a text to the footer. It can be set via

```
\setbeamertemplate{frame footer}{My custom footer}
```


Some references to showcase [allowframebreaks] [?, ?, ?, ?, ?]

Conclusion

Summary

Get the source of this theme and the demo presentation from

`github.com/matze/mtheme`

The theme *itself* is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.



Questions?

Backup slides

Sometimes, it is useful to add slides at the end of your presentation to refer to during audience questions.

The best way to do this is to include the `appendixnumberbeamer` package in your preamble and call `\appendix` before your backup slides.

METROPOLIS will automatically turn off slide numbering and progress bars for slides in the appendix.

