System składu LaTeX w zastosowaniach akademickich

Spotkanie #08–#09

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Instytut Psychologii
Uniwersytet im. A. Mickiewicza w Poznaniu

Reasonig Research Group

Poznań, 5/12.12.2018

Preambuła i style

```
\documentclass{beamer}
```

```
\usetheme{Warsaw}
```

Preambuła i style

```
\usetheme{default}
```

Darmstadt, Madrid, Boadilla, ...
Zestawienie tematów Beamera ▸ LINK

```
\usecolortheme{default}
```

albatross, beaver, crane, ...

```
\usefonttheme{default}
```

serif, structurebold, ...

Preambuła: Brak symboli w prawym dolnym rogu

```
\setbeamertemplate{navigation symbols}{}
```

Preambuła: Brak symboli w prawym dolnym rogu

```
\setbeamertemplate{navigation symbols}{}
```

Przy tej opcji warto również dodać

```
\setbeamertemplate{caption}[numbered]
```

Preambuła: tytuł

```
\title[Krótki tytuł prezentacji]
                {Tytuł prezentacji}

\subtitle{Podtytuł prezentacji}
```

Preambuła: autor

```
\author{Imię Nazwisko}

\institute[Pewien Uniwersytet]
   {Instytut Spraw Bardzo Ważnych\\
    Pewien Uniwersytet}
```

Preambuła: wielu autorów

```
\author[Autor1, Autor2, Autor3]
{F.~Autor1\inst{1} \and S.~Autor2\inst{2}
                   \and R.~Autor3\inst{3}}

\institute[Pewien Uniwersytet]
{
\inst{1}
Afiliacja autora pierwszego
\and
\inst{2}
Afiliacja autora drugiego
\and
\inst{3}
Afiliacja autora trzeciego}
}
```

Preambuła: data

```
\date[5.04.2018]{5.04.2018}
```

```
\date[24--26.11.2017]
     {CaL2017\\24--26 November 2017, Brno}
```

Preambuła: logotyp

```
\pgfdeclareimage[height=0.5cm]{university-logo}
                          {plik-z-obrazkiem}
\logo{\pgfuseimage{university-logo}}
```

Slajd (na trzy sposoby)

```
\begin{frame}
\frametitle{Tytuł slajdu}
\framesubtitle{Podtytuł}
          Tresc slajdu
\end{frame}

\begin{frame}{Tytuł slajdu}{Podtytuł}
    Tresc slajdu
\end{frame}

\frame{
  \frametitle{Tytuł slajdu}
  \framesubtitle{Podtytuł}
               Tresc slajdu
}
```

Slajd tytułowy

```
\begin{frame}
\maketitle
\end{frame}

\begin{frame}[plain]
\maketitle
\end{frame}
```

Podział dokumentu

```
\section[Section]{My section}
\subsection[Subsection]{My subsection}
\subsubsection[Subsubsection]{My subsubsection}
```

Spis treści

```
\begin{frame}
\frametitle{Plan prezentacji}
\tableofcontents
\end{frame}
```

Podział dokumentu

W preambule

```
\AtBeginSubsection[]
{
\begin{frame}<beamer>
\frametitle{Outline}
\tableofcontents[currentsection,currentsubsection]
\end{frame}
}
```

Efekty wyświetlania treści

W preambule:

```
\beamerdefaultoverlayspecification{<+->}
```

Efekty wyświetlania treści

```
\begin{frame}
\frametitle{Dobra prezentacja}
\framesubtitle{Kilka zasad}
\begin{itemize}[<+->]
\item Używaj wypunktowania.
\item Prezentacja powinna być krótka.
\end{itemize}
\end{frame}
```

Efekty wyświetlania treści

```
\begin{frame}
\frametitle{Dobra prezentacja}
\framesubtitle{Kilka zasad}
\begin{itemize}
\item Używaj wypunktowania.
\item Prezentacja powinna być krótka.\pause
\item Jest jeszcze kilka innych zasad,
\item o których warto poczytać w tutorialu Beamera.
\end{itemize}
\end{frame}
```

Efekty wyświetlania treści

```
\begin{frame}
\frametitle{Dobra prezentacja}
\framesubtitle{Efekty list}
\begin{itemize}
\item<1-> Najpierw chciałbym, żeby Państwo zobaczyli jednocześnie to \ldots
\item<2-> zaś dopiero później to
\item<3-> i to.
\item<1-> \ldots i to,
\end{itemize}
\end{frame}
```

Nieliniowe przejścia między slajdami

Slajd docelowy

```
\begin{frame}
\label{contents}
```

Link do slajdu

```
\hyperlink{etykieta}{Dowód twierdzenia 1}.
```

```
\hyperlink{etykieta}{
    \beamerbutton{Dowód twierdzenia 1}
                 }
```

- `beamergotobutton`
- `beamerskipbutton`

Otoczenie `block`

```
\begin{block}{Tytuł}
    zawartość
\end{block}
```

```
\begin{exampleblock}{Tytuł}
    zawartość
\end{exampleblock}
```

```
\begin{alertblock}{Tytuł}
    zawartość
\end{alertblock}
```

Otoczenie `block`

Tytuł

zawartość

Tytuł

zawartość

Tytuł

zawartość

Otoczenie `example` i `definition`

```
\begin{example}
    zawartość
\end{example}
```

Example

zawartość

```
\begin{definition}
    zawartość
\end{definition}
```

Definition

zawartość

Tło dla wszystkich slajdów

W preambule

```
\setbeamertemplate{background canvas}
{\includegraphics[width=\paperwidth,
                  height=\paperheight]
                      {plik-z-grafika}
}
```

Rozmiar slajdu 128$mm \times$ 96mm.

Tło dla wszystkich slajdów

CAPTCHA systems

- The main task of a CAPTCHA is to differentiate *bots* (malicious programs) and human users in online services.
  - services offering free e-mail accounts;
  - commenting blogs;
  - sending SMS/MMS messages via web pages;
  - community portals;
  - online polls;
  - etc.

Obrazek na cały slajd

```
{
\setbeamertemplate{navigation symbols}{}
\setbeamertemplate{background canvas}{
            \includegraphics[height = \paperheight,
                             width = \paperwidth]{image.jpg}
                             }
   \begin{frame}[plain]
   \end{frame}
}
```

CAPTCHA systems

- The main task of a CAPTCHA is to differentiate *bots* (malicious programs) and human users in online services.
  - services offering free e-mail accounts;
  - commenting blogs;
  - sending SMS/MMS messages via web pages;
  - community portals;
  - online polls;
  - etc.

Bibliografia w Beamerze

```
\begin{frame}[allowframebreaks]
\frametitle<presentation>{Literatura}
\begin{thebibliography}{10}
\beamertemplatebookbibitems
\bibitem{Autor1990}
A.~Autor.
\newblock {\em Introduction to Giving Presentations}.
\newblock Klein-Verlag, 1990.

\beamertemplatearticlebibitems
\bibitem{Jemand2000}
S.~Jemand.
\newblock On this and that.
\newblock {\em Journal of This and That}, 2(1):50--100, 2000.
\end{thebibliography}
\end{frame}
```

Bibliografia w Beamerze

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\begin{frame}[allowframebreaks]
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S.~Jemand.
\newblock On this and that.
\newblock {\em Journal of This and That}, 2(1):50--100, 2000.
\end{thebibliography}
\end{frame}
```

Literatura I

A. Autor.
Introduction to Giving Presentations.
Klein-Verlag, 1990.

S. Jemand.
On this and that.
Journal of This and That, 2(1):50–100, 2000.

Bibliografia w Beamerze

```
\usepackage{apacite}
\usepackage{natbib}


\begin{frame}[allowframebreaks]
\frametitle{References}
\def\newblock{}
\bibliographystyle{apa}
\bibliography{plik-bib}
\end{frame}
```

Kod źródłowy w Beamerze (`fragile`)

```
\def\newblock{}
\bibliographystyle{apa}
\bibliography{book}
```

```
\def\newblock{}
\bibliographystyle{apa}
\bibliography{book}
```

- verbatim
- Verbatim
- lstlisting
- ...

Kod źródłowy w Beamerze (`fragile`)

```
\begin{frame}[fragile]
\frametitle{Tytuł}
Zawartość
\end{frame}
```

```
\begin{frame}[fragile]{Tytuł}
Zawartość
\end{frame}
```

Handouty

W preambule

```
\documentclass[handout]{beamer}
\usepackage{pgfpages}
\pgfpagesuselayout{2 on 1}
    [a4paper,border shrink=5mm]
```

Handouty

W preambule

```
\documentclass[handout]{beamer}
\usepackage{pgfpages}
\pgfpagesuselayout{4 on 1}
[a4paper,landscape,border shrink=3mm]
```

System składu LaTeX w zastosowaniach akademickich

Spotkanie #05

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Reasonig Research Group

Poznań, 5.04.2018

Preambuła i style

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\documentclass{beamer}
```

```
\usetheme{Warsaw}
```


Preambuła i style

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\usetheme{default}
```

Darmstadt, Madrid, ...

```
\usecolortheme{default}
```

albatross, beaver, crane, ...

```
\usefonttheme{default}
```

serif, structurebold, ...

Preambuła: Brak symboli w prawym dolnym rogu

```
\setbeamertemplate{navigation symbols}{}
```

Przy tej opcji warto również dodać

```
\setbeamertemplate{caption}[numbered]
```

Warto wiedzieć

powerdot

- Osobna klasa do tworzenia prezentacji (nie jest pochodną Beamera).
- Wiele dostępnych stylów prezentacji.
- Dobra dokumentacja `ftp://ftp.gust.org.pl/TeX/macros/latex/contrib/powerdot/doc/powerdot.pdf`
- Kompilacja silnikiem `latex` (niestety).

Example of the default style

Hendri Adriaens Christopher Ellison

December 31, 2013

Example slide

Here is the binomium formula.

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^{n-k} b^k \qquad (1)$$

We will prove formula (1) on the blackboard.

- Here
  - is
    - a
      - list
    - with
  - seven
- items.

Example of the aggie style

Hendri Adriaens Christopher Ellison

December 31, 2013

Example slide

Here is the binomium formula.

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^{n-k} b^k \qquad (1)$$

We will prove formula (1) on the blackboard.

- Here
  - is
    - a
      - list
    - with
  - seven
- items.

Ciekawe szablony prezentacji (oparte na Beamerze)

DarkConsole

>>> Test
>>> DarkConsole

Name: Anonim†
Date: April 4, 2018

†mail@mail.com

[~]$ _ [1/4]

>>> Outline

1. First section

2. Second section

[~]$ _ [2/4]

>>> Test

Zwykly tekst niewypunktowany.

1. pierwszy
2. drugi
3. trzeci

[1. First section]$ _ [3/4]

>>> Theorem

Theorem (Gauss)

$$\int_{-\infty}^{\infty} \mathrm{e}^{-x^2}\,\mathrm{d}x = \sqrt{\pi}. \tag{1}$$

[2. Second section]$ _ [4/4]

Ciekawe szablony prezentacji (oparte na Beamerze)

Metropolis

Metropolis

A modern beamer theme

Matthias Vogelgesang

Center for modern beamer themes

Introduction

Metropolis

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.

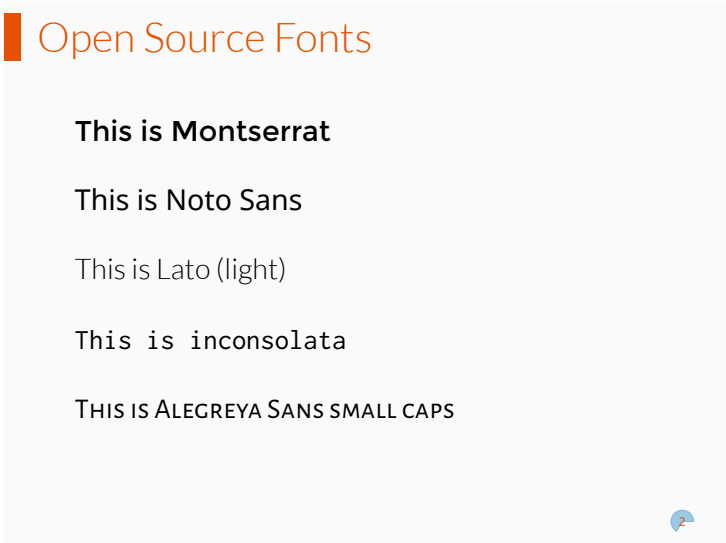
1

Questions?

1

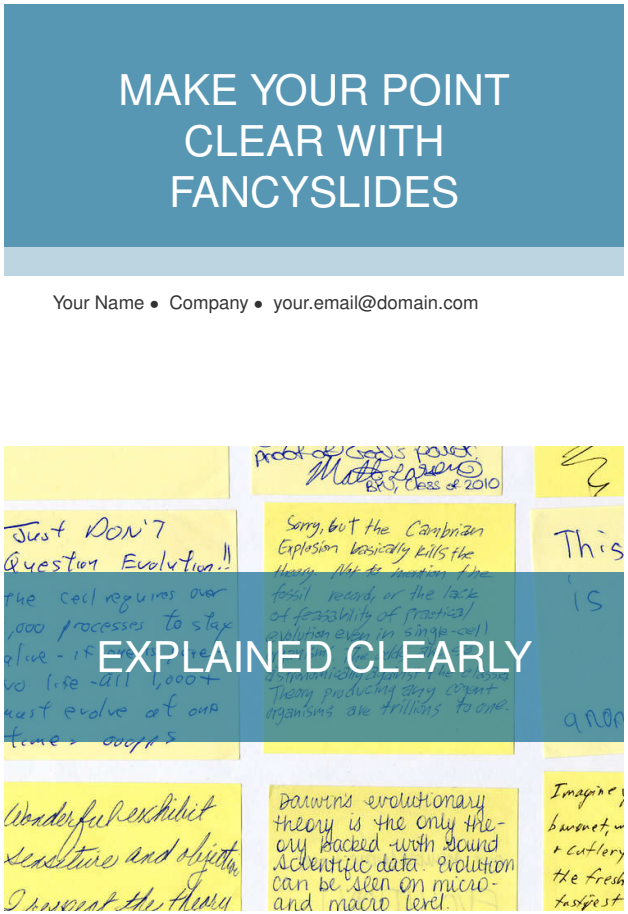
Ciekawe szablony prezentacji (oparte na Beamerze)

Presento



Ciekawe szablony prezentacji (oparte na Beamerze)

Fancyslides



`https://ctan.org/pkg/fancyslides`

Fancyslides

`https://ctan.org/pkg/fancyslides`

- *fancyslides.cls* – document class;
- *example.tex* – an exemplary file ready to compile it with *pdflatex*;
- *example.pdf* – a compiled example, to give you an impression of the *Fancsyslides* look & feel;
- *blank.jpg*, *1.jpg* and *2.jpg* – exemplary background graphics;
- *fancyslides.pdf* – intro.

Kompilacja

pdflatex

Fancyslides

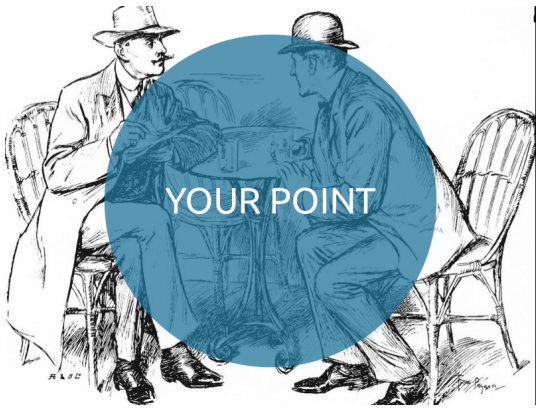
```
\newcommand{\titlephrase}{MAKE YOUR POINT CLEAR WITH FANCYSLIDES}
\newcommand{\name}{Your Name}
\newcommand{\affil}{Company}
\newcommand{\email}{your.email@domain.com}
```

Fancyslides

```
\fbckg{1}
\begin{frame}
\pointedsl{your point}
\end{frame}


\fbckg{2}
\begin{frame}
\framedsl{explained clearly}
\end{frame}
```

Fancyslides



(a) pointedsl

(b) framedsl

(c) itemized

Fancyslides

```
\begin{document}
\startingslide
```

```
\fbckg{1}
\begin{frame}
  \thankyou
\end{frame}
```

Fancyslides

```
\fbckg{2}
\begin{frame}
\itemized{
\item BEAMER EASE OF USE
\item MODERN LOOK \& FEEL
}
\end{frame}


\fbckg{2}
\begin{frame}
\framedsl{
\pitem{pointed slogan}
\pitem{framed slogan}
\fitem{beamer features}
}
\end{frame}
```

Postery – klasa **baposter**

Preambuła

```
\documentclass[opcje]{baposter}
```

landscape/portrait układ strony

a0paper, a1paper, a2paper, a3paper, a4paper predefiniowane rozmiary strony

margin=length marginesy

showframe pokazuje ramkę wokół strony (pomocne przy układaniu treści)

```
\documentclass[landscape,a1paper]{baposter}
```

Otoczenie `poster`

```
\begin{poster}{ key=ustawienia }
{ Eye Catcher (grafika) }
{ Tytul }
{ Autor }
{ Logo }

Tresci

\end{poster}
```

Ustawienia otoczenia `poster`

grid={yes,no} wyświetl siatkę (użyteczne przy ustawianiu treści

columns=4 liczba kolumn (landscape – domyślne 4, portrait – 3); max. 6

colspacing=length odległość pomiędzy kolumnami

eyecatcher={yes,no} grafika w lewym górnym rogu

Ustawienia otoczenia `poster`

background=poster background type typ tła

1. `plain`: jeden kolor (`bgColorOne`)
2. `shade-lr`: gradient (poziomo) (od `bgColorOne` do `bgColorTwo`)
3. `shade-tb`: gradient (pionowo) (od `bgColorOne` do `bgColorTwo`)
4. `none`: brak tła

bgColorOne=pgf color name

bgColorTwo=pgf color name

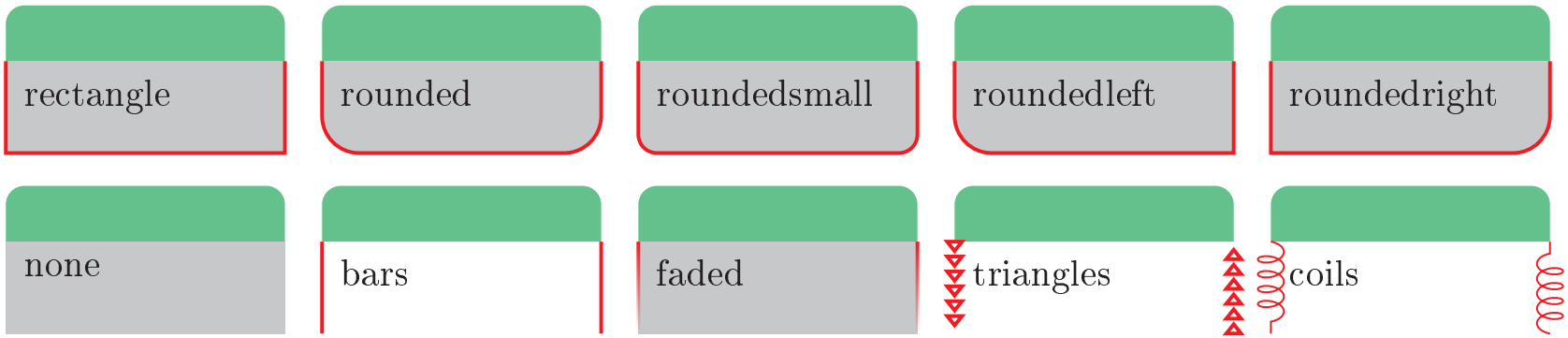
Ustawienia dla „pudełek” na posterze

borderColor=pgf color name kolor ramki

headerColorOne=pgf color name kolor pudełka

headerColorTwo=pgf color name drugi kolor pudełka (dla gradientów)

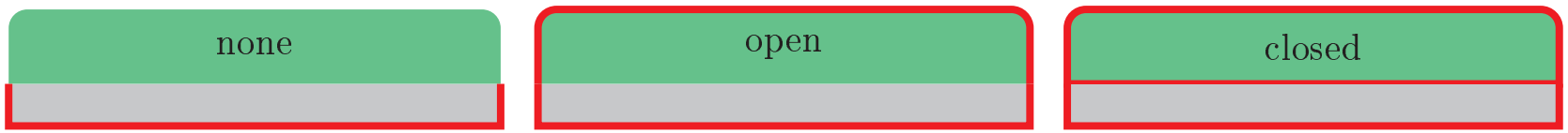
textborder=border type wygląd dolnej części pudełka



Ustawienia dla „pudełek” na posterze

linewidth=length grubość linii dla ramek

headerborder=header border type



headershape=header border shape

Ustawienia dla „pudełek” na posterze

headershade=type of header shading cieniowanie nagłówka pudełka

1. plain
2. shade-lr
3. shade-tb
4. shade-tb-inverse

boxshade cieniowanie pudełka

1. shade-lr
2. shade-tb
3. plain
4. none

Przykład ustawień

```
\begin{poster}{
grid=false,
columns=3,
colspacing=0.7em,
headerColorOne=cyan!20!white!90!black,
borderColor=cyan!30!white!90!black,
textborder=faded,
headerborder=open,
headershape=roundedright,
headershade=plain,
background=none,
bgColorOne=cyan!10!white,
headerheight=0.13\textheight
}
...
```

Przykład ustawień

Introduction

Online LaTeX environment:

- Editor.
- Compiler.
- Files storage.
- Templates and wizards.
- Sharing and collaboration.

WriteLaTeX

www.writelatex.com

Privacy & Terms of Service (https://www.writelatex.com/legal#Security) 'By using our Services you provide us with information, files, and folders that you submit to **writeLaTeX** (together, 'your stuff'). You retain full ownership to your stuff. We don't claim any ownership to any of it.'

Comparison

Functionalities (free accounts)

	writeLaTeX	ShareLaTeX
compilers	pdfLaTeX	pdfLaTeX, LaTeX, XeLaTeX
templates	✓	✓
services int.	Figshare,Dropbox, GoogleDrive	✗
*.zip project upload	✗	✓
easy links (e.g. from latextemplatex.com)	✓	✗
sharing	g+, in, f, t, url	url
polish package	✓	✓
file history	✓	✗
mobile browser	✓	✓

Compilation The test document was an article written in the ltugboat class (16.5 KB, 2694 words, one table, two bar-charts created with the barchart package, bibliography in the *.bib file). Editors were run in the Google Chrome browser (version 26.0.1410.63, running on the GNU/Linux powered machine with 1GB RAM memory, connection ETH, 100 Mb/s). The compilation times for the test document (first compilation).

Pudełka

```
\headerbox{Tytul}{name=etykieta,
                  column=0,row=0,
                  span=1}{
zawartosc
}
```

Przykład

```
\headerbox{Introduction}{name=introduction,
                         column=0,row=0,
                         span=1}{...}
\headerbox{Write\LaTeX}{name=writelatex,
                        column=0,row=0,
                        span=1,
                        below=introduction}
                        {...}
\headerbox{ShareLaTeX}{name=sharelatex,
                       column=0,row=0,span=1,
                       below=writelatex}{...}
```

Przykład ustawień

Introduction

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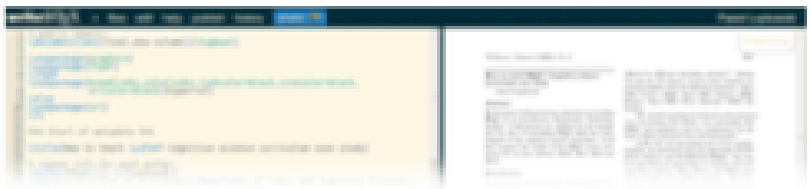
WriteLaTeX



www.writelatex.com

Privacy & Terms of Service (https://www.writelatex.com/legal#Security) 'By using our Services you provide us with information, files, and folders that you submit to **writeLaTeX** (together, 'your stuff'). You retain full ownership to your stuff. We don't claim any ownership to any of it.'

ShareLaTeX

Przykład

```
\headerbox{Introduction}{name=introduction,
                         column=0,row=0,
                         span=1}{...}
\headerbox{Comparison}{name=comparison,
                       column=1,row=0,
                       span=1}{...}
\headerbox{Go mobile!}{name=mobile,
                       column=2,row=0,
                       span=1}{...}
```

Przykład ustawień

Introduction

Online LaTeX environment:

- Editor.
- Compiler.
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- Templates and wizards.
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WriteLaTeX

Comparison

Functionalities (free accounts)

	writeLaTeX	ShareLaTeX
compilers	pdfLaTeX	pdfLaTeX, LaTeX, XeLaTeX
templates	✓	✓
services int.	Figshare, Dropbox, GoogleDrive	✗
*zip project upload	✗	✓
easy links (e.g.		

Go mobile!

iVerbTeX

VerbTeX

www.verbosus.com/

Create, store and manage LaTeX projects on your mobile de-

Optimal Landmark Detection using Shape Models and Branch and Bound

{ Brian.Amberg and Thomas.Vetter }@unibas.ch

Problem

Fitting statistical 2D and 3D shape models to images is necessary for a variety of tasks, such as video editing and face recognition. Much progress has been made on local fitting from an initial guess, but determining a close enough initial guess is still an open problem. We propose a method to locate fiducial points, which can then be used to initialize the fitting.

Contributions

We overcome the inherent ambiguity in landmark detection by using global shape information. We solve the combinatorial problem of selecting out of a large number of candidate landmark detections the configuration which is best supported by a shape model. Our method, as opposed to previous approaches, always finds the globally optimal configuration.

The algorithm can be applied to a very general class of shape models and is independent of the underlying feature point detector. Its theoretic optimality is shown, and it is evaluated on a large face dataset.

Formulation

The solution is constrained by a shape model

$$M(\Theta) = (m_1(\Theta), \dots, m_N(\Theta)) \qquad (1)$$
$$m_i : \mathbb{R}^{N_\Theta} \to \mathbb{R}^2$$

mapping model parameters Θ to image positions $m_i(\Theta)$. For each fiducial point m_i a set of candidate positions

$$L_i = \{l_i^1, l_i^2, \dots\} \qquad l_i^j \in \mathbb{R}^2 \qquad (2)$$

is detected in the image. The task is to assign to every model vertex one of the candidate positions such that the shape model can be best fit to the selection $\mathbf{S}$, written as a tuple

$$\mathbf{S} = (j_1, j_2, \dots, j_N) \qquad j_i \in \mathbb{N}, \qquad (3)$$

where j_i is the index of a candidate of landmark i.

So we minimize the distance between the shape model and the image landmarks:

$$\mathbf{S}^* = \underset{\mathbf{S}=(j_1,\dots,j_N)}{\arg\min} \; f(\mathbf{S})$$
$$f(\mathbf{S}) = \min_{\Theta} \sum_i \rho\left(\left\| m_i(\Theta) - l_i^{j_i} \right\|\right) \quad . \qquad (4)$$

Where $\rho : \mathbb{R} \to \mathbb{R}$ is a robust function, allowing us to handle missing detections, and points which are invisible due to occlusion.

References

[1] B. Amberg, T. Vetter. Optimal Landmark Detection using Shape Models and Branch and Bound. In *ICCV '11*

Results

Some randomly chosen images from the color feret database for each pose, and the detected landmark positions. The first two rows are success cases, the last row shows a failure case.

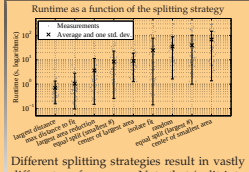
Solution

This discrete optimization is solved by Branch and Bound, which is a method to minimize a function over a set. It requires us to (1) efficiently specify solution subsets, (2) determine a lower bound on the minimal cost of the solutions within a subset, and (3) specify a strategy to split a solution subset into two new subsets.

The ingredients in our case are:

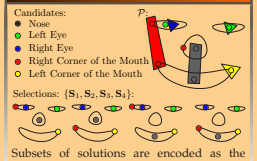
1. Solution subsets are created by taking subsets of landmark candidates, and considering the Kartesian product of all selected landmark candidates
2. We bound the cost for such a solution set by taking for each landmark the minimal distance to the convex hull of the selected candidates
3. We found that splitting landmark candidates such that the convex hull of the resulting two landmark candidates are as distant as possible is most effective.

Splitting Strategy



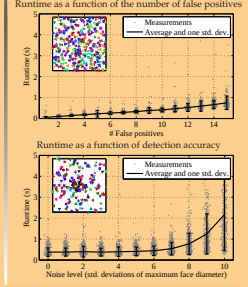
Different splitting strategies result in vastly different performance. Note that 'split into equal sized problems' is one of the worst strategies for branch and bound.

Representation



Subsets of solutions are encoded as the Kartesian product of subsets of landmark candidates per fiducial point.

Scaling Behaviour



Source Code

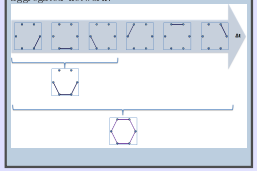
The source code is available at `http://www.cs.unibas.ch/personen/amberg_brian/bnb/`

Properties of Elementary Random and Preferential Dynamic Networks

Richard O. Legendi, Laszlo Gulyas, George Kampis
legendi@inf.elte.hu, lgulyas@colbud.hu, gkampis@colbud.hu

Problem

Sampling networks always involves the act of aggregation (e.g., when collecting longitudinal samples of networks). We sutdy how the cumulation window length effects the properties of the aggregated network.



Basic Concepts

In our work the dynamic network is a series of graphs, that is, $DN = G_t(V_t, E_t)$, where $E_t \subseteq V_t \times V_t \; (\forall t \geq 0)$. The initial network, G_0, is considered as a parameter of the process. The **node set fixed** and we worked with an about **constant number of edges**. We assume that the evolution of the network can be described as the result of an edge creation and an edge deletion process. We define G_t as the **snapshot network** and

$$G_T = (\bigcup_{t=0}^{T} V_t, \bigcup_{t=0}^{T} E_t) \text{ for } T \geq 0.$$

as the **cumulative network**.

Models

ER1 G_0 is a random graph. Add each non-existing edge with p_A, delete each existing edge with p_D probability.
ER2 G_0 is a random graph. Add k_A uniformly selected random new edges and delete k_D existing edges.
ER3 G_0 is a random graph. Rewire k_{RW} edges.
SPA (*Snapshot preferential*) G_0 is a scale free network. Add k_A edges from a random node with preferential attachment based on the snapshot network. Delete k_D existing edges.
CPA (*Cumulative preferential*) G_0 is a scale free network. Add k_A edges from a random node with preferential attachment based on the cumulative network. Delete k_D existing edges.

References

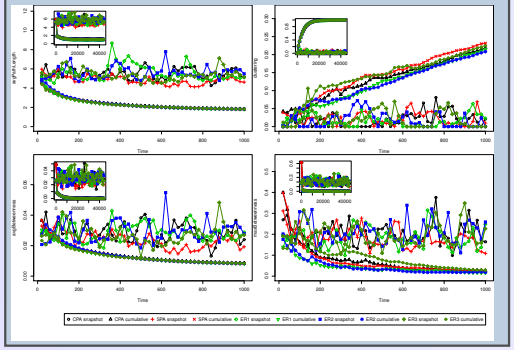
[1] Laszlo Gulyas, Richard Legendi: *Effects of Sample Duration on Network Statistics in Elementary Models of Dynamic Networks*, International Conference on Computational Science, Singapore (2011)
[2] Laszlo Gulyas, Susan Khor, Richard Legendi and George Kampis *Cumulative Properties of Elementary Dynamic Networks*, The International Sunbelt Social Network Conference XXXI (2011)
[3] Gulyas, Laszlo et al.: *Betweenness Centrality Dynamics in Networks of Changing Density*, Presented at the 191th International Symposium on Mathematical Theory of Networks and Systems (MTNS2010)

Acknowledgements

This research was partially supported by the Hungarian Government (KMOP-1.1.2-08/1-2008-0002) and the European Union's Seventh Framework Programme: DynaNets, FET-Open project no. FET-233847 (http://www.dynanets.org). The supports are gratefully acknowledged.

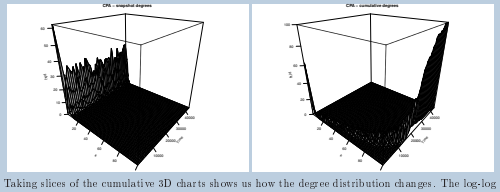
Dynamic Networks are Sensitive to Aggregation

Network characteristics are extremely sensitive to minor changes in aggregation length. In our previous work [1] [2], we studied the cumulative properties of Elementary Dynamic Network models over the complete time period (i.e., until they reach the stable point of a full network). Here we focus on the more realistic domain of sparse (cumulative) networks. We find that even when snapshot networks are stationary, **important network characteristics** (average path lenght, clustering, betweenness centrality) **are extremely sensitive to aggregation** (window length).

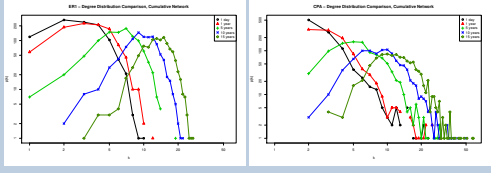


Degree Distribution Radically Changes

Degree distributions are exceptionally sensitive to the length of the aggregation window. **The same dynamic network may produce a normal, lognormal or even power law distribution for different aggregation lenghts.** The digree distribution of the snapshot and cumulative network is inherently different. The following surfaces show the CPA model until it approaches the complete network.



Taking slices of the cumulative 3D charts shows us how the degree distribution changes. The log-log charts below show the progression of these changes as the aggregation window gets larger.



Expression Invariant Face Recognition using a 3D Morphable Model

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Microsoft Research UNI BASEL

Contribution

We introduce a method for expression invariant face recognition. A generative 3D Morphable Model (3DMM) is used to separate identity and expression components. The expression removal results in greatly increased recognition performance, even on difficult datasets, without a decrease in performance on expression-less datasets.
It is applicable to any kind of input data, and was evaluated here on textureless range scans.

Model

The Model was learnt from 175 subjects. We used one neutral expression scan per identity and 50 expression scans of a subset of the subjects.
The identity model is a linear model build from the neutral scans.

$$\boldsymbol{f} = \boldsymbol{\mu} + \mathbf{M}_n \boldsymbol{\alpha}_n \quad . \tag{1}$$

For each of the 50 expression scans, we calculated an expression vector as the difference between the expression scan and the corresponding neutral scan of that subject. This data is already mode-centered, if we regard the neutral expression as the natural mode of expression data. From these offset vectors an additional expression matrix $\mathbf{M}_e$ was calculated, such that the complete linear Model is

$$\boldsymbol{f} = \boldsymbol{\mu} + \mathbf{M}_n \boldsymbol{\alpha}_n + \mathbf{M}_e \boldsymbol{\alpha}_e \tag{2}$$

The assumption here is, that the face and expression space are linearly independent, such that each face is represented by a unique set of coefficients.

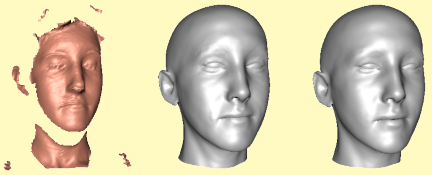
Fitting

A Robust Nonrigid ICP method was used to fit the model to the data. Robustness was achieved by iteratively reweighting the correspondences and using hard compatability test for the closest points. Fitting was initialized by a simple nose detector and proceeded fully automatic.

Distance Measure

The Mahalanobis angle between the identity coefficients $\boldsymbol{\alpha}_n$ was used for classification.

Expression Neutralization

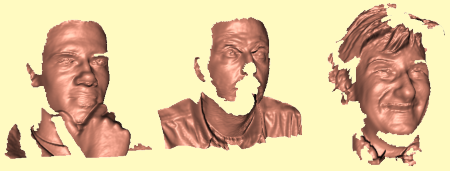


a) Target b) Fit c) Normalized

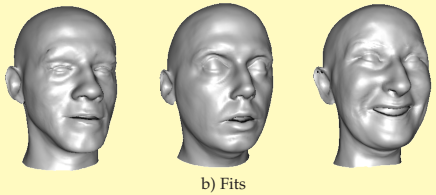
a) Target b) Fit c) Normalized

Expression normalisation for two scans of the same individual. The robust fitting gives a good estimate (b) of the true face surface given the noisy measurement (a). It fills in holes and removes artifacts using prior knowledge from the face model. The pose and expression normalized faces (c) are used for face recognition.

Robustness



a) Targets

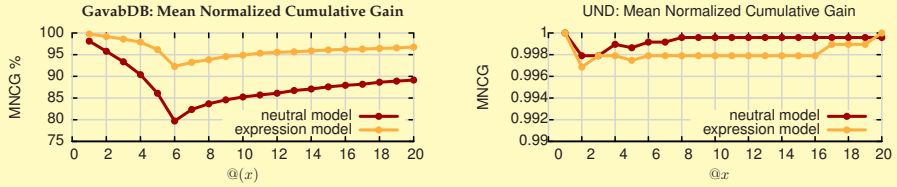


b) Fits

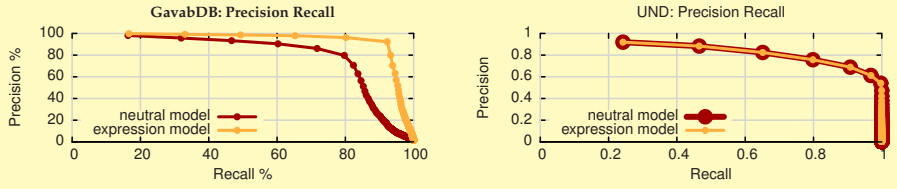
The reconstruction (b) is robust against scans (a) with artifacts, noise, and holes.

Results

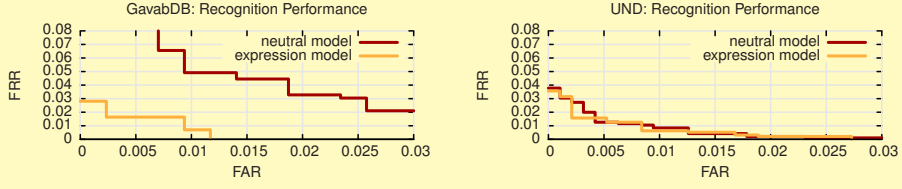
The method was evaluated on the GavabDB expression dataset which contains 427 Scans, with 3 neutral scans and 4 expression scans per ID. To test the impact of expression invariance on neutral data we used the UND Dataset from the Face Recognition Great Vendor Test, which contains 953 neutral scans with one to eight scans per subject.



Expression neutralization improves results on the expression dataset without decreasing the accuracy on the neutral testset. Plotted is the ratio of correct answers to the number of possible correct answers.



Plotted are precision and recall for different retrieval depths. The lower precision of the UND database is due to the fact that some queries have no correct answers.



Impostor detection is reliable, as the minimum distance to a match is smaller than the minimum distance to a nonmatch.

Open Questions

While the expression and identity space are linearly independent, there is some expression left in the identity model. This is because a "neutral" face is interpreted differently by the subjects. We investigate the possibilty to build an identity/expression separated model without using the data labelling, based on a measure of independence.

References

[1] B. Amberg, S. Romdhani, T. Vetter. Optimal Step Nonrigid ICP Algorithms for Surface Registration In *CVPR 2007*

[2] B. Amberg, R. Knothe, T. Vetter. Expression Invariant Face Recognition with a 3D Morphable Model In *AFGR 2008*

Funding

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Ćwiczenie

Przygotuj **prezentację** na wybrany przez siebie temat

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