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## RESEARCH REPORT

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**Example creation system**

**Guide for authors**

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Any opinions and conclusions expressed in this report are those of the authors and do not necessarily represent the views of the involved institutions.

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# 1 Introduction

This report describes a system for creating examples for fully probabilistic dynamic decision making [1]. It represents a documentation for authors who wish to create the examples for PhD students or to add their new developed algorithms to the system. General scheme of the example creation system (ECS) is demonstrated at Figure 1. The presented scheme can be interpreted in the following way. It can often

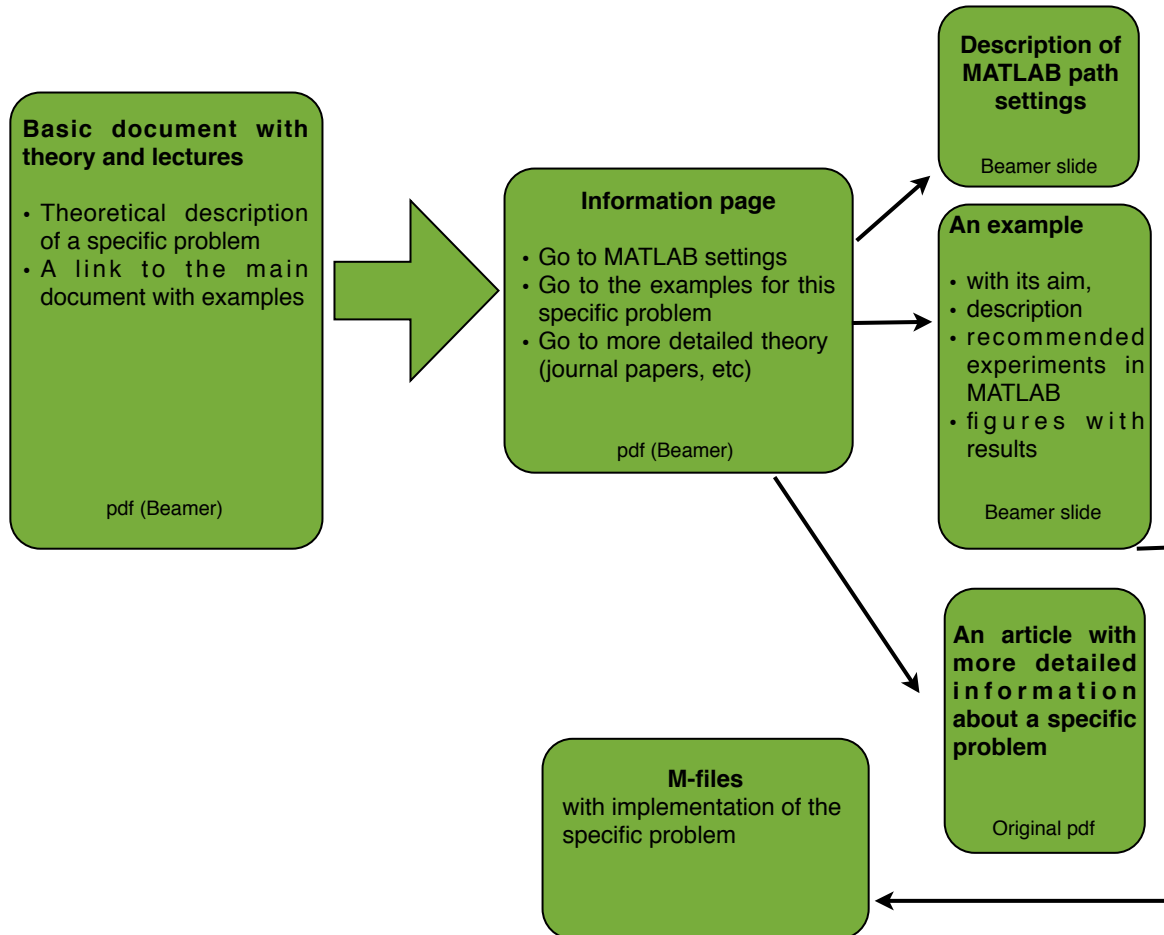


Figure 1: General scheme of ECS

happen that one has a prepared text with theory, where a series of specific tasks is discussed, and wishes to add an example for some of the tasks along with MATLAB [2] implementation and more detailed information (journal article, etc). For this aim, in the main text with theory it is necessary to add a hyperlink, which refers to a document with a corresponding group of examples. Using of hyperlinks in ECS is discussed in Section 6. The mentioned document demonstrates a so called information-page, which enables to be directed at

- necessary settings of paths in MATLAB,
- needed example(s),
- journal articles, book, etc in pdf.

After redirecting to a page with a needed example, one can read its aim, description and information about location of respective m-files. Experiments recommended for performing in MATLAB are described along with figures of possible results of experiments.

## 2 System location

Currently ECS is available for download at

<http://mys.utia.cas.cz:1800/svn/educalibre/pracovni/examples2010>

## 3 Folder structure

A structure of folders, existing or to be added to the system, can be presented with the help of the following scheme, see Figure 2. The main folder is 'examples2010', which contains

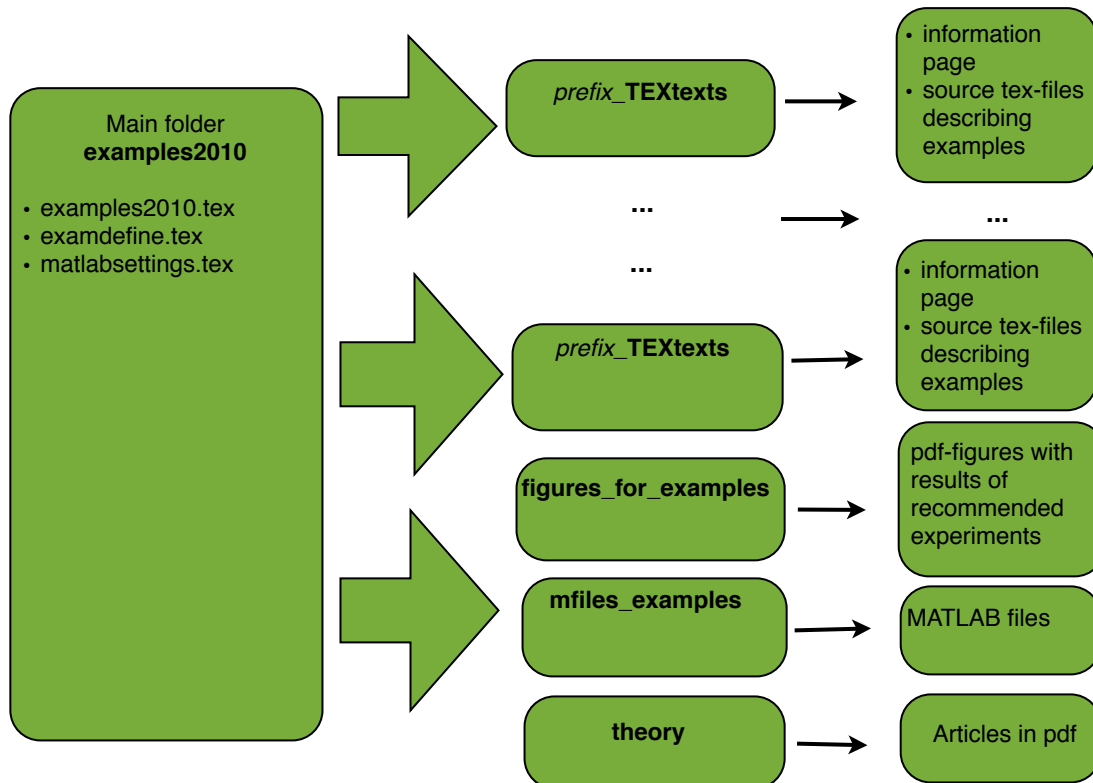


Figure 2: Structure of folders in ECS

- the main document 'examples2010.tex', which then includes the source tex-files with description of corresponding examples,
- file with commands and packages 'examdefine.tex'
- and 'matlabsettings.tex', where information about paths in MATLAB should be placed.

Folders denoted '*prefix*\_TEXtexts' assume that instead of *prefix* some identifier of a relevant specific task and a group of corresponding examples has to be used. For instance, *arx* is for examples for normal autoregressive model (ARX) or *mix* – for examples for mixture models and so on. Formally it depends upon conventions taken by authors.

Each folder '*prefix*\_TEXtexts' contains

- an information page shown at the scheme at Figure 1, existing for a specific task with identifier *prefix* and a group of examples for it,
- source tex-file(s) titled '*prefix*\_name.tex', bringing information about certain examples, which have to be included in the main document 'examples2010.tex'.

Folder 'figures\_for\_examples' contains MATLAB figures saved in pdf format that are used for demonstrating possible results of recommended experiments in the above source tex-files. This folder is for all examples.

Folder 'mfiles\_examples' is determined for placing MATLAB files with implementations of tasks.

Folder 'theory' contains pdf documents with journal articles, book chapters, etc, providing more information about specific tasks.

## 4 Structure of templates for authors

In order to create a new example and add it to ECS, one has, firstly, to make a new source tex-file in a corresponding existing folder '*prefix*\_TEXTtexts'. The name of the new created file must contain the prefix of the used folder and then the clear understandable denotation of a task discussed in the example. For instance, in folder 'arx\_TEXTtexts' file 'arx\_simul.tex' can exist, which means simulation of the ARX model. The new example must have a form according to a template located in the same folder.

The template can be found as '*prefix*\_template.tex' in the needed folder and has the following structure. The main currently used environment in L<sup>A</sup>T<sub>E</sub>X is slides of Beamer. It supposes that at the beginning of the source file one should define a title of an example instead of a frametitle, i.e.,

```
\begin{frame}\frametitle{Write title of your example}
```

Generally the slides are organized as a list of items. At the beginning of the first slide an author should give a unique label to the example with the help of command `\tde{your label}{your text}` or `\hypertarget{your label}{do not write anything}`. It can look as

```
\begin{itemize}
\tde{your_label}{Insert text describing your example}
```

or in the following way.

```
\frametitle{ARX model simulation\hypertarget{arx_sim}{}}
```

Both the commands are supported. The text content of the example depends upon the author. A text should bring clear and readable aim and description of the presented example and its connection with a basic document with theory shown at Figure 1. Authors are recommended to use denotations and conventions from the basic theory.

After description of the example a location of m-files for the example should be given in the following way

```
\item
MATLAB implementation of your example is available in
\begin{center}
{\tt{mfiles\_examples/name\_of\_mfile.m}}.
\end{center}
```

where 'mfiles\_examples' is a folder for MATLAB files, see Figure 2, and 'name\_of\_mfile.m' should be changed by the name of your m-file.

Then it is supposed that a author adds a link which refers to experiments that can be done within the example. MATLAB setting can be also checked at this phase of the example, i.e.,

```
\item See recommended experiments \hde{recomexp}
\item See settings for MATLAB \hde{matlab}
\end{itemize}
```

where command `\hde{}` creates a hyperlink to your label `recomexp`, which you has added near the text with your recommended experiments. It means that the next slide after slide(s) with a description of the examples takes the following form

```

\begin{frame}\frametitle{Recommended experiments in MATLAB}
\begin{itemize}
\tde{recomexp}{The aim of your experiment}
\end{itemize}
\begin{columns}
\hspace*{0.3cm}\column{4cm}
\begin{block}{Title of experiment}
Observe something interesting...
\end{block}
\column{10cm}
your figure with results
of the experiment
\begin{figure}
\centering
\includegraphics[scale=0.4]{figures_for_examples/determ}
\end{figure}
\end{columns}
\end{frame}

```

After preparing a source tex-file, an author has to include it to the main document 'examples2010.tex' shown at Figure 2 via the command

```
\include{arx_TEXtexts/arx_template} % a template for authors
```

inserting corresponding names of a folder and a file. After compilation, a page with recommended experiments of an example has a form that can be seen at Figure 3.

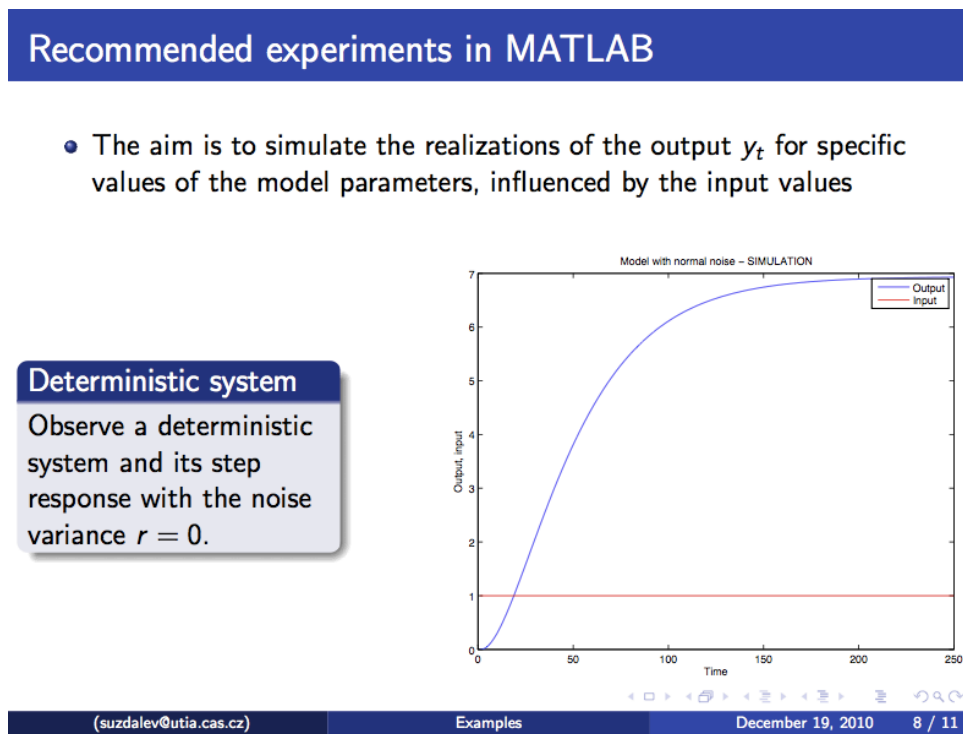


Figure 3: A page with recommended experiments of an example

## 5 Information page structure

If an author wants to create a new folder '*prefix*.TEXtexts' for a task which is still not discussed in ECS, it is necessary to add an information page besides the files with texts of the examples. The information page is available in the form of file '*prefix*.readme.tex' in each folder. Its structure is the same for all the tasks but hyperlinks (exploitation of hyperlinks is explained in Section 6). An information page '*prefix*.readme.tex' has the following structure.

```
\begin{frame}
\begin{columns}
\column{3cm}
~
\column{5cm}
\begin{block}{Go to}
MATLAB settings \hde{matlab}
\end{block}

\begin{block}{Go to}
\begin{enumerate}
\item Example \hde{template}
\item ARX model simulation \hde{arxsim}
\end{enumerate}
\end{block}

\begin{block}{Go to}
More theory \hde{theory/peterka_included.pdf.9}
\end{block}
\column{3cm}~
\end{columns}
\end{frame}
```

It can be seen that command `\hde{label}` refers to pages (examples or MATLAB settings) with the defined labels (more information about commands for creating hyperlinks in ECS is available in Section 6). In the last block, a link to a pdf-file at page 9 with more detailed theory is given via the same command. One has to copy this pdf-file to folder 'theory', see Figure 2, and then to include it to the main document 'examples2010.tex' at the end of the file via the command

```
\includepdf [pages=9-29,link=true,fitpaper]{theory/peterka_included.pdf}
```

The edited information page is also included to the main document 'examples2010.tex' with the help of

```
\include{arx_TEXtexts/arx_readme} %information page
```

for the corresponding *prefix*. After compilation of 'examples2010.tex' the information page looks as it is shown at Figure 4. Small arrows that can be seen at Figure 4 are the hyperlinks mentioned above.

## 6 Creation of hyperlinks in the system

Within one Beamer document (which means with all included source files) hyperlinks are created in ECS with the help of the following two commands

```
\newcommand{\hde}[1]{\hyperlink{#1}{\color{blue}{\tiny\hspace*{-0.5em}$\Lsh$}}}}
\newcommand{\tde}[2]{\item \hypertarget{#1}{#2}}
```

that can be found in 'examdefine.tex' shown at Figure 2.

As it can be seen, command `\tde{your label}{...some text...}` makes an itemized hypertarget that is useful in slides, where most of information is itemized. However, if itemization is not required, one can use simply `\hypertarget{your label}{}` with the second empty brackets. Further, to make a



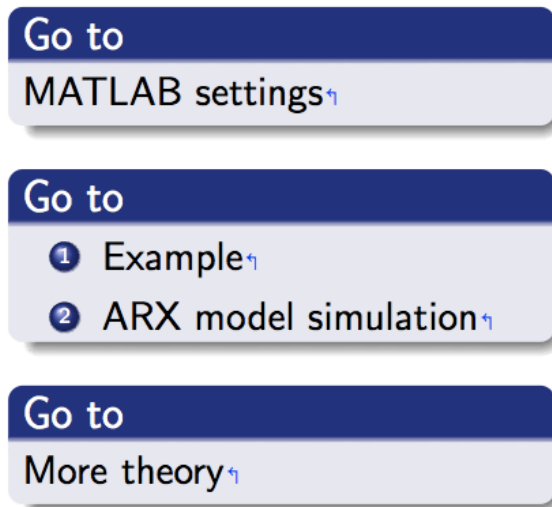


Figure 4: An information page for a group of examples

link to the created hypertarget, it is enough to use command `\tde{needed label}`, which adds a blue arrow with a hyperlink to the itemized environment, as it is shown at Figure 4.

To make a hyperlink to pdf document with more theory included at the end of 'examples2010.tex', one can also use command `\tde{needed label}`, where instead of a label it is necessary to write a path and a name of the pdf document with the number of a start page, for instance,

```
\hde{theory/peterka_included.pdf.9}
```

## 7 References from basic document with theory and lectures

When an example is prepared, one can add a hyperlink to it from the basic document with theory and lectures shown at Figure 1. In order to create a hyperlink in another Beamer document which refers to any needed information page, one has to use command

```
\newcommand{\referto}[3][./] {\href{#1#2\#page.#3} {\color{blue}{\tiny\hspace*{-0.5em}$\Lsh$}}}}
```

that can be again found in 'examdefine.tex' shown at Figure 2. The command has two compulsory parameters written into {}. The first one – 1 – is a name of pdf file (without suffix), the second one – 2 – is a number of target page in the file. There is one voluntary parameter written into [], which is a path to the file in format: "folder/". Default settings are the same folder where the compiled file is located.

Surely it is necessary to add this definition to a document to be compiled.

It means that in order to make references to some information page of the required group of examples, it is enough to write, for instance,

```
\item Go to example \referto{examples2010}{2}
```

where 'examples2010' is a name of the needed pdf file and 2 is a number of target page. The result is in the form of a blue arrow with a hyperlink similar to that demonstrated at Figure 4.

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## References

- [1] M. Kárný, J. Böhm, T. V. Guy, L. Jirsa, I. Nagy, P. Nedoma, and L. Tesař, *Optimized Bayesian Dynamic Advising: Theory and Algorithms*, Springer, London, 2005.
- [2] The Matlab Inc., *Matlab documentation*, vol.MA 01760-2098, Natick, 2000.