

MACHINE LEARNING

Teddy van Jerry

Instructor: TeX - LaTeX Stack Exchange

LaTeX Template

Documentation 1.0

Section 1: Basic Information of This Template Class

Despite this *SEU-ML-Assign* class is dedicated to Southeast University as the Machine Learning assignment L^AT_EX template both for teachers and students, it can also be used for other schools. In the near future, it will eventually become an elegant template for all assignment requirements.

Package Class Name	seu-ml-assign
Version	1.0 (2022/03/20)
Description	L ^A T _E X Template for Southeast University Machine Learning Assignment
Author	Teddy van Jerry (Wuqiong Zhao)
Maintainer	Teddy van Jerry (Wuqiong Zhao)
GitHub Repository	https://tvj.one/ml-tex
Issues	https://tvj.one/ml-tex/issues
Open Source License	MIT License (https://tvj.one/ml-tex/blob/master/LICENSE)

You can contact me at me@tvj.one for support.

Section 2: Class Options

To use this template, put `seu-ml-assign.cls` file under the same directory with your main `tex` file.

```
\documentclass{seu-ml-assign} % SEU Machine Learning Assignment Template
```

There are 6 supported options:

Option	Description
<code>solution</code>	Write solutions (for students). [Default]
<code>problem</code>	Write problem sets (for instructors).
<code>9pt</code>	Set font size as 9 points.
<code>10pt</code>	Set font size as 10 points. [Default]
<code>11pt</code>	Set font size as 11 points.
<code>12pt</code>	Set font size as 12 points.

For example, a 10pt document for instructors to create an assignment consisting of problem sets should use

```
\documentclass[10pt,problem]{seu-ml-assign} % The 10pt option can be omitted.
```

There are several differences between the `solution` mode and `problem` mode, including the preset texts on the document (for example the student name is not shown in the `problem` mode) and some properties can only be used with the `problem` mode which will be elaborated on in §3.2.

Section 3: Document Properties

(1) Fields There are several fields to set. Consider the following example used in the sample file:

<code>\title{Assignment}</code>	<code>% Document Type: assignment, quiz, etc.</code>
<code>\author{Teddy van Jerry}</code>	<code>% Your Name</code>
<code>\studentID{61520522}</code>	<code>% Your Student ID</code>
<code>\instructor{TeX - LaTeX Stack Exchange}</code>	<code>% The Name of Your Instructor</code>
<code>\date{\today}</code>	<code>% The Submission or Release Date</code>
<code>\duedate{20:00 March 21, 2022}</code>	<code>% The Time the Assignment is Due</code>
<code>\assignno{1}</code>	<code>% Assignment Number</code>
<code>\semester{SEU --- 2022 Spring}</code>	<code>% Semester</code>

With these fields set, you can use the command `\maketitle` to print the title. At the same time, the metadata for the PDF document is automatically set.

(2) Problem Mode Only Properties One of the fields `\author{}` and `\instructor{}` can be omitted or set as empty provided that they are the same.

Section 4: Section Title (Problem) Settings

(1) Normal Title The title of a problem can be set as `\section{This is a Section Title}` or uses a higher level command `\problem{This is a Section Title}`.

(2) Problem with Points The points of a problem can be set using command `\problempts{xxx}` before calling the `\section{}` command. These two commands can be simplified to `\problem[xxx]{}`. For example, using the command `\problem[15]{This is a Problem Worth 15 Points}` will have:

Problem 1: This is a Problem Worth 15 Points (15 points)

Note that if the point is an empty string, the point information will not be shown.

(3) Long Title Compatibility There is also no problem if the section title is too long.

Problem 2: I Don't Think that Anyone Will Enjoy Themselves Seeing a Very Very Long Problem That is Worth Twenty Points in this Machine Learning Course (20 points)

(4) Section Title Name The name of the section (default name as `problem`) can be changed by using `\renewcommand{\sectionheadname}{Name}`.

(5) Section Number The number of the section can be changed, for example `\texttt{\setproblem{4}}` will make the next section number be 5. For experienced L^AT_EX users to understand, this command actually change the section counter.

(6) Solution Declaration You can use `\startsolution` to declare you start writing the solution. This will reset the section number and it is especially useful when your document contains problems and solutions as two separate parts. There is an option `print` and if you use `\startsolution[print]` you will get:

SOLUTION

and the word SOLUTION can be changed using command `\renewcommand{\solutionname}{Other Name}`.

Section 5: Subsection Title (Sub Problem) Settings

- (1) **Normal Title** This is a normal title using command `\subproblem{Normal Title}` or its equivalent command `\subsection{Normal Title}`.
- (2) Use `\subproblem{}` or `\subsection{}` if only the sub problem number is required (like this line).
- (3) **Subsection Number** Similar to `\setproblem{}`, there is also `\setsubproblem{}`.

Section 6: Other Tools

- (1) **Equation Numbering** The equation number is within the section (problem), for example

$$\det(\mathbf{A}) = 1 \times \begin{vmatrix} -5 & 3 \\ -6 & 4 \end{vmatrix} - (-3) \times \begin{vmatrix} 3 & 3 \\ 6 & 4 \end{vmatrix} + 3 \times \begin{vmatrix} 3 & -5 \\ 6 & -6 \end{vmatrix} = 1 \times (-2) + 3 \times (-6) + 3 \times 12 = 16. \quad (6.1)$$

- (2) **Maths Packages** Maths Package `mathtools`, `amssymb`, `amsthm`, `bm` and `nicematrix` are automatically loaded. The `nicematrix` package is especially powerful in terms of writing a matrix. You can find its documentation at <https://ctan.org/pkg/nicematrix>.

- (3) **Fancy Box** A fancy box has been defined.

This is a Title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin viverra massa rutrum felis vulputate, ac faucibus velit accumsan. Vivamus aliquet felis nec interdum sollicitudin. Nullam ornare eu velit id cursus. Maecenas a sodales velit, vel cursus magna. Cras lobortis venenatis.

You can use the following code to generate it.

```
\begin{fancybox}{This is a Title}
  Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin viverra massa
  → rutrum felis vulputate, ac faucibus velit accumsan. Vivamus aliquet felis nec
  → interdum sollicitudin. Nullam ornare eu velit id cursus. Maecenas a sodales
  → velit, vel cursus magna. Cras lobortis venenatis.
\end{fancybox}
```

Appendix A: Known Issues

- `\section*{}` still shows the section number except for it does not increment the section counter by one;
- The section title background height may not be accurate;
- The style of the footnote line has not been adapted to the current colorful theme.

Appendix B: Source Code

The source code of `SEU-ML-Assign.cls` is listed below.

```
15 \NeedsTeXFormat{LaTeX2e}
16 \ProvidesClass{seu-ml-assign}[2022/02/20 SEU Machine Learning Assignment Template]
17
```

```

18 %% Class and Options
19 \def\@@ptsize{10pt} % font size
20 \DeclareOption{9pt}{\def\@@ptsize{9pt}}
21 \DeclareOption{10pt}{\def\@@ptsize{10pt}}
22 \DeclareOption{11pt}{\def\@@ptsize{11pt}}
23 \DeclareOption{12pt}{\def\@@ptsize{12pt}}
24 \def\@@solutionmode{1} % default as the solution mode
25 \DeclareOption{solution}{\def\@@solutionmode{1}} % solution mode
26 \DeclareOption{problem}{\def\@@solutionmode{0}} % problem mode
27 \ProcessOptions\relax
28 \LoadClass[a4paper, onecolumn, \@@ptsize]{article}
29
30 %% Page Settings
31 \RequirePackage[inner=2.0cm, outer=2.0cm, top=1.2cm, bottom=3.5cm]{geometry}
32 \newcommand{\firstfooteradditionalheight}{2em} % additional height for footer on the
    ↪ first page
33 \hfuzz=.5em % disable false positive of overfull \hbox
34
35 %% Document Properties
36 \global\let\@assignno\@empty
37 \global\let\@semester\@empty
38 \global\let\@studentID\@empty
39 \global\let\@instructor\@empty
40 \global\let\@duedate\@empty
41 \global\let\@author\@empty
42 \newcommand{\@assignno}[1]{\gdef\@assignno{#1}} % Assignment Number
43 \newcommand{\@semester}[1]{\gdef\@semester{#1}} % Semester
44 \newcommand{\@studentID}[1]{\gdef\@studentID{#1}} % Student ID
45 \newcommand{\@instructor}[1]{\gdef\@instructor{#1}} % Instructor
46 \newcommand{\@duedate}[1]{\gdef\@duedate{#1}} % Due Date of the Assignment
47
48 %% Fonts and Colors
49 \RequirePackage[T1]{fontenc}
50 \RequirePackage[usenames, dvipsnames]{xcolor}
51
52 %% TikZ Rule
53 \RequirePackage{tikz}
54 \usetikzlibrary{fadings, calc}
55 \newcommand{\tikzrule}[3][\tikz{\fill[#1] (0,0) rectangle (#2,#3);}]
56
57 %% Sections Settings
58 \RequirePackage[explicit]{titlesec} % explained in
    ↪ https://tex.stackexchange.com/a/292307/234654
59 % http://mirrors.ctan.org/macros/latex/contrib/titlesec/titlesec.pdf
60 \pgfdeclarelayer{background}
61 \pgfsetlayers{background, main}
62 \global\let\@problempts\@empty
63 \newcommand{\@problempts}[1]{\gdef\@problempts{#1}} % Points of the Problem
64 \newcommand{\@problemptsprint}{\ifx\@problempts\@empty\else(\@problempts~points)\fi}
65 \newcommand{\@sectionheadname}{Problem} % Name for the Section (default as 'Problem')
66 % Reference: https://tex.stackexchange.com/a/12269/234654
67 \newcommand{\boxedsection}[3][blue!20]{%
68     \begin{tikzpicture}[inner sep=0pt, inner ysep=0.3ex]
69         \node[anchor=base west] at (0,0) (counter) {#2};
70         \path let \p1 = (counter.base east) in node[anchor=base west, text
            ↪ width={\textwidth-\x1-0.33em}] (content)
71             at ($(counter.base east)+(0.33em,0)$) {#3};
72         \begin{pgfonlayer}{background}
73             \shade[left color=#1, right color=white] let \p1=(counter.north),
            ↪ \p2=(content.north) in
74             (0, {max(\y1, \y2)}) rectangle (content.south east);
75         \end{pgfonlayer}
76     \end{tikzpicture}
77 }

```

```

78 % \titleformat{<command>}
79 %     [<shape>]{<format>}{<label>}{<sep>}{<before-code>}[<after-code>]
80 \titleformat{\section}%
81     {\Large\bfseries}%
82     {}%
83     {0pt}%
84     {\boxedsection{\sectionheadname{} \thesection:}{#1}}%
85     [%
86         \vspace{-2.1\baselineskip}\hfill{\normalfont\small\problemptsprint}%
87         \problempts{}}% clear the problem points
88     ]%
89 \newcommand{\setproblem}[1]{\ifx#1\@empty\else\setcounter{section}{#1}\fi} % force
    ↳ the number of problem
90 \newcommand{\setsubproblem}[1]{\ifx#1\@empty\else\setcounter{subsection}{#1}\fi} %
    ↳ force the number of subproblem
91 \newcommand{\problem}[2][\problempts{#1}\section{#2}]%
92 \newcommand{\solutionname}{Solution}
93 \newcommand{\startsolution}[1][print]{%
94     \setproblem{0}% reset the section counter
95     \def\startsolutionprintoption{print}
96     \def\startsolutionprintuseroption{#1}
97     \ifx\startsolutionprintuseroption\startsolutionprintoption{%
98         {%
99             \fontfamily{LinuxLibertineT-OfF}\selectfont% select font as Linux
            ↳ Libertine
100             \centering\LARGE\scshape%
101             \solutionname{}\[-0.2em]%
102         }%
103         \noindent%
104         \tikzrule[WildStrawberry, path fading=west]{.5\textwidth}{.2em}% <-- Do not
            ↳ remove this
105         \tikzrule[WildStrawberry, path fading=east]{.5\textwidth}{.2em}
106     }\fi%
107 }
108 \titlespacing*{\section}{0em}{2.5\baselineskip}{1\baselineskip}
109 \titleformat{\subsection}[runin]{\large\bfseries}{\}{0pt}{(\arabic{subsection}) #1}%
110 \newcommand{\subproblem}[2][\subsection{#1}{#2}]
111 \titleformat{\subsubsection}[runin]{\}{\}{0pt}{(\arabic{subsubsection}). #1}
112
113 %% Maths Settings
114 \RequirePackage{mathtools}
115 \RequirePackage{amssymb}
116 \RequirePackage{amsthm} % proof environment and others
117 \RequirePackage{bm} % \bm command
118 \RequirePackage{nicematrix}
119 \numberwithin{equation}{section}
120
121 %% Code Block Settings
122 \RequirePackage{listings}
123 \definecolor{dkgreen}{rgb}{0,0.5,0}
124 \definecolor{gray}{rgb}{0.5,0.5,0.5}
125 \definecolor{mauve}{rgb}{0.58,0,0.82}
126 \lstset{
127     numbers=left,
128     frame=tb,
129     aboveskip=3mm,
130     belowskip=3mm,
131     showstringspaces=false,
132     columns=fixed,
133     framerule=1pt,
134     rulecolor=\color{gray!35},
135     backgroundcolor=\color{gray!5},
136     basicstyle={\ttfamily\small},
137     numberstyle=\footnotesize\color{gray},

```

```

138 keywordstyle=\bfseries\color{blue},
139 commentstyle=\color{dkgreen},
140 stringstyle=\color{mauve},
141 breaklines=true,
142 breakatwhitespace=true,
143 tabsize=2,
144 extendedchars=false,
145 postbreak=\mbox{\hspace{-1.4em}\textcolor{purple}{\${hookrightarrow}\space}}
146 }
147
148 %% Captions Settings
149 \RequirePackage[font=footnotesize,labelfont=bf]{caption}
150
151 %% Color Boxes
152 \RequirePackage[many]{tcolorbox}
153 \RequirePackage{varwidth}
154 \newtcolorbox{fancybox}[2][]{enhanced,skin=enhancedlast jigsaw,
155   attach boxed title to top left={xshift=-4mm,yshift=-0.5mm},
156   fonttitle=\bfseries\sffamily,varwidth boxed title=0.7\linewidth,
157   colbacktitle=blue!45!white,colframe=red!50!black,
158   interior style={top color=blue!10!white,bottom color=red!10!white},
159   boxed title style={empty,arc=0pt,outer arc=0pt,boxrule=0pt},
160   underlay boxed title={
161     \fill[blue!45!white] (title.north west) -- (title.north east)
162     --+(\tcboxedtitleheight-1mm,-\tcboxedtitleheight+1mm)
163     --([xshift=4mm,yshift=0.5mm]frame.north east) -- +(0mm,-1mm)
164     --(title.south west) -- cycle;
165     \fill[blue!45!white!50!black] ([yshift=-0.5mm]frame.north west)
166     --+(-0.4,0) -- +(0,-0.3) -- cycle;
167     \fill[blue!45!white!50!black] ([yshift=-0.5mm]frame.north east)
168     -- +(0,-0.3) -- +(0.4,0) -- cycle; },
169   title={#2},#1
170 }
171 \newtcolorbox{notice}[2][]{enhanced,
172   colframe=blue!50!black,colback=blue!10!white,colbacktitle=blue!5!yellow!10!white,
173   fonttitle=\bfseries,coltitle=black,attach boxed title to top center=
174   {yshift=-0.25mm-\tcboxedtitleheight/2,yshifttext=2mm-\tcboxedtitleheight/2},
175   boxed title style={boxrule=0.5mm,
176   frame code={ \path[tcb fill frame] ([xshift=-4mm]frame.west)
177   -- (frame.north west) -- (frame.north east) -- ([xshift=4mm]frame.east)
178   -- (frame.south east) -- (frame.south west) -- cycle; },
179   interior code={ \path[tcb fill interior] ([xshift=-2mm]interior.west)
180   -- (interior.north west) -- (interior.north east)
181   -- ([xshift=2mm]interior.east) -- (interior.south east) -- (interior.south west)
182   -- cycle; } },
183   title={#2},#1
184 }
185
186 %% Header and Footer
187 \RequirePackage{fancyhdr}
188 \RequirePackage[colorlinks=true,urlcolor=blue,linkcolor=purple,citecolor=red]{hyperref}
189 \setlength{\headheight}{52pt}
190 \setlength{\marginparwidth}{2cm}
191 \pagestyle{fancy}
192 \lhead{
193   \fontfamily{LinuxLibertineT-0sF}\selectfont
194   \if\@solutionmodel
195     \textsc{\@title~\@assignno} -- \studentID~\@author
196   \else
197     \textsc{Machine Learning \@title~\@assignno}
198   \fi
199 }
200
201 \rhead{\thepage}

```

```

202 \renewcommand\headrule{\vspace{-0.7em}\tikzrule[BrickRed, path
    ↪ fading=east]{.5\textwidth}{0.3mm}}
203 \cfoot{}
204 % header and footer style for the first page
205 \fancypagestyle{firstpage}{
206     \renewcommand\headrule{}
207     \lhead{}
208     \rhead{}
209     \cfoot{
210         \fontfamily{LinuxLibertineT-0sF}\selectfont
211         \vspace*{-\firstfooteradditionalheight}
212         \vspace{-1.5em}
213         \tikzrule[purple, path fading=west]{.5\textwidth}{.15em}% <-- Do not remove
            ↪ this
214         \tikzrule[purple, path fading=east]{.5\textwidth}{.15em}
215
216         \footnotesize\centering
217         \if\@solutionmode1
218             This \MakeLowercase{\@title{}} is due \@duedate{} and the date of
            ↪ submission is \@date.
219         \else
220             This \MakeLowercase{\@title{}} is due \textbf{\@duedate{}} and the
            ↪ version of the problem set is \@date.
221         \fi
222
223         % LaTeX template information
224         \LaTeX{} template for this \MakeLowercase{\@title{}} is
            ↪ \textit{SEU-ML-Assign}
225         open source at \href{https://tvj.one/ml-tex}{tvj.one/ml-tex} under the MIT
            ↪ License.
226         E-mail \href{mailto:me@tvj.one}{me@tvj.one} for support.
227     }
228 }
229
230 %% Title Settings
231 \RequirePackage{tabularx}
232 \RequirePackage{afterpage}
233 \newcommand{\pdftitleadditionalname}{Solution}
234 \makeatletter
235 \renewcommand\maketitle{
236
237     \if\@solutionmode0
238         \ifx\@instructor\@empty
239             \let\@instructor\@author % author is the instructor (if not specified)
240         \else
241             \ifx\@author\@empty
242                 \let\@author\@instructor % instructor is the author (if not
                    ↪ specified)
243             \fi
244         \fi
245     \fi
246
247     \thispagestyle{firstpage}
248     \fontfamily{LinuxLibertineT-0sF}\selectfont % set font as Linux Libertine
249     \enlargethispage{-\firstfooteradditionalheight} % make room for the footer
250     \begin{minipage}{10.5cm}
251         \centering
252         {
253             \fontsize{36}{48}\selectfont
254             \textcolor{Plum}{\scshape Machine Learning}
255         }\\[.5em]
256         {
257             \if\@solutionmode1
258                 \@studentID~\@author

```

```

259         \quad
260         \fi
261         \textit{Instructor:~\@instructor}
262     }
263 \end{minipage}
264 \begin{minipage}{5cm}
265     \vspace{0.7em}
266     \centering
267     {
268         \large
269         \textcolor{BrickRed}{\sffamily \@semester}
270         \vspace{2mm}
271     }
272     \LARGE\@title~{\fontfamily{bch}\selectfont\@assignno}
273 \end{minipage}
274 \[\!{.3em}
275 \tikzrule[cyan, path fading=east]{\textwidth}{.4em}
276 \vspace{2mm}
277
278 \fontfamily{cmr}\selectfont % Computer Modern
279
280 % Set up document meta data
281 % Note that it should be placed here because
282 % by now \@author and \@title have been set.
283 \hypersetup{
284     pdfauthor={\@author},
285     pdftitle={%
286         \@title~\@assignno~
287         \if\@solutionmode1
288             \pdftitleadditionalname{}
289         \fi
290         - Machine Learning
291     },
292     pdfsubject={Machine Learning},
293     pdfkeywords={Machine Learning, \@title},
294     pdfcreator={LaTeX with SEU-ML-Assign class},
295     pdfproducer={LaTeX}
296 }
297 }
298 \makeatother

```