

Research Paper Writing with LaTeX (lay-tech)

Prepared and presented:
Amr Aboeleneen

(some slides/images has been adapted from multiple sources)

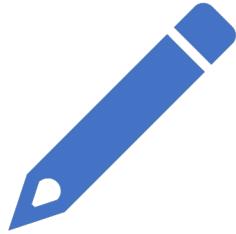
Outline

- Motivation & why latex
- Sectioning and organization
- Figures
- Tables
- Referencing with Mendeley
- Bonus : online collaboration, versioning and debugging

Motivation



Writing Papers



Writing **Good** Papers

=



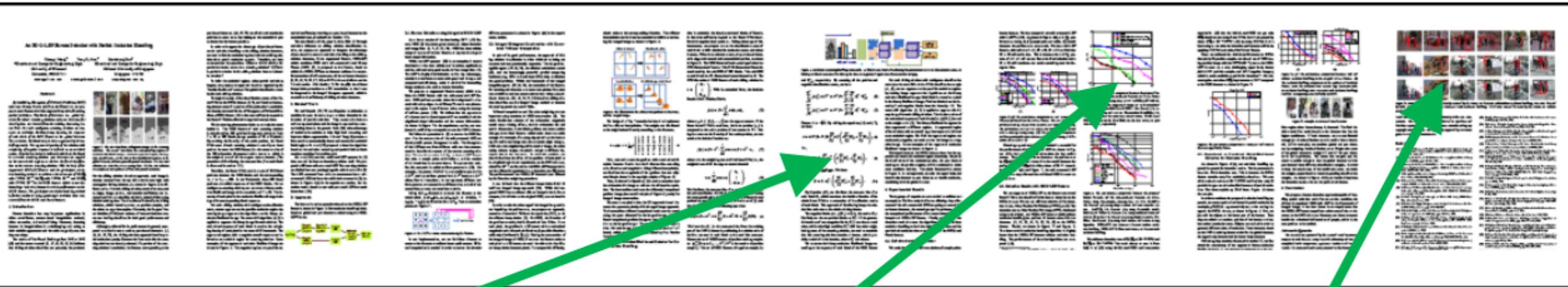
Conveying Your Ideas

=



Conveying Your Ideas
Effectively

Characteristics of a “Good” paper

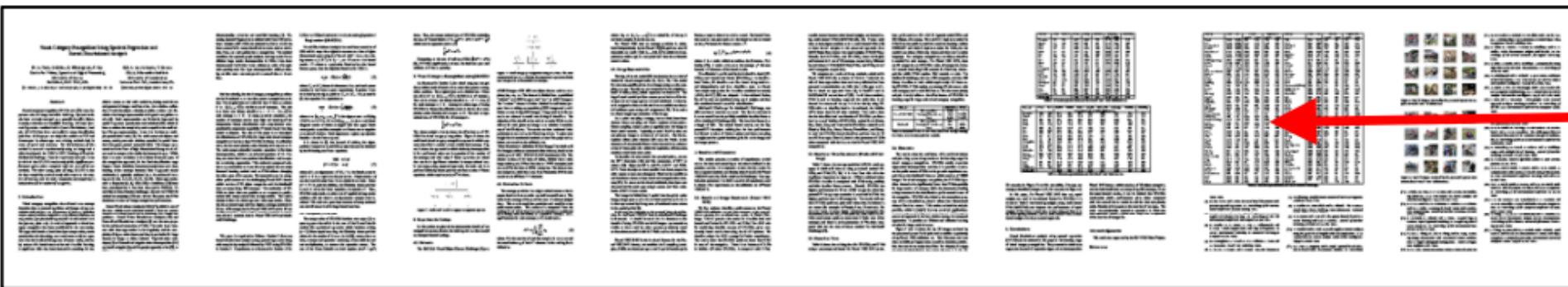


Math: Sophisticated mathematical expressions make a paper look technical and make the authors appear knowledgeable and “smart”.

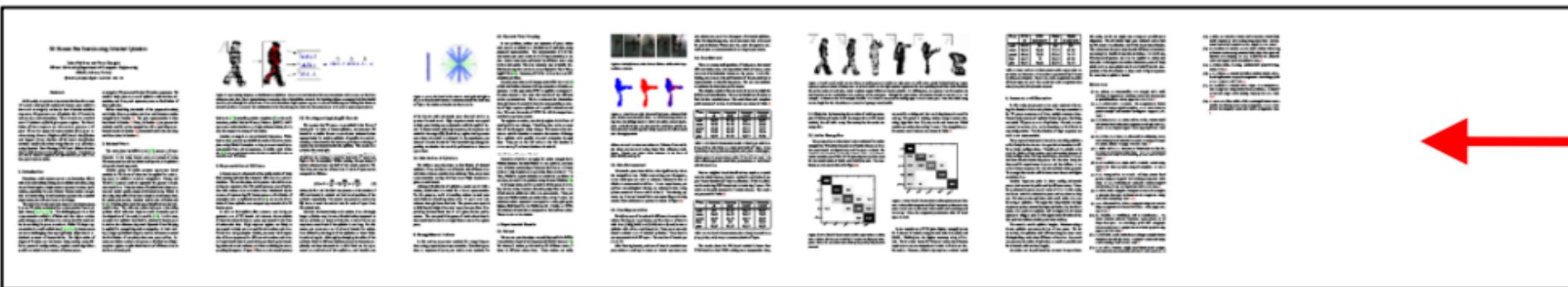
Plots: ROC, PR, and other performance plots convey a sense of thoroughness. Standard deviation bars are particularly pleasing to a scientific eye.

Figures/Screenshots: Illustrative figures that express complex algorithms in terms of 3rd grade visuals are always a must. Screenshots of anecdotal results are also very effective.

Characteristics of “Bad” papers



Large confusing tables.



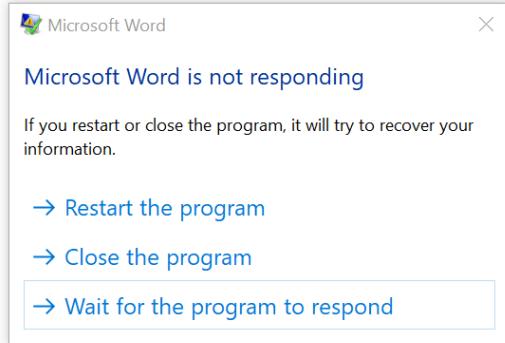
Missing pages.



Lack of colorful figures.

Why LaTe χ ?

- Great typesetting tool, better management and styling
- You don't need to worry about crashing , numbering sections , figures or tables
- Style and content separation
 - Easier to re-submit the rejected paper to somewhere else (?)
- Beautiful math equations
- Reference management capability
- What if you deleted something by mistake ? (versioning)
- Online collaboration
- Exporting to different formats
- Output can be opened by MS-word (experimental)
- Free



Demo : Starting out with Overleaf

The screenshot shows the Overleaf web interface. At the top, there's a navigation bar with links for 'Features & Benefits', 'Templates', 'Plans & Pricing', and 'Help'. On the far right of the bar, there are 'Register' and 'Log In' buttons, which are highlighted with a red rectangle. Below the bar, the main title 'LaTeX, Evolved' is displayed in large white letters, followed by the subtitle 'The easy to use, online, collaborative LaTeX editor'. The central area shows a LaTeX document titled 'The Universe'. The code editor on the left contains the following LaTeX code:

```
1 \documentclass{article}
2 \usepackage[utf8]{inputenc}
3
4 \title{The Universe}
5 \author{}
6 \date{May 2019}
7
8 \usepackage[natbib]
9 \usepackage{graphicx}
10
11 \begin{document}
12
13 \maketitle
14
15 \section{Introduction}
16 There is a theory which states that if ever anyone discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something even more bizarre and inexplicable.
17 There is another theory which states that everything in existence is a side effect of an enormous explosion that occurred once in a very long time ago.
18
19 \begin{figure}[h]
20 \centering
21 \includegraphics[width=0.8\textwidth]{universe.jpg}
22 \caption{The Universe}
23 \label{fig:universe}
24 \end{figure}
25
26 \section{Conclusion}
27 ``I always thought something was fundamentally wrong with our universe'' \citet{adams1995hitchhiker}
28
29 \bibliographystyle{plain}
30 \bibliography{references.bib}
31 \end{document}
```

The preview window on the right shows the document's output: a title page with the title 'The Universe' and the date 'May 2019', followed by a section titled 'Introduction' containing the text from the code. A small image of a galaxy is also visible. At the bottom of the interface, there's a call-to-action section with a 'Get started now' button, email input fields ('email@example.com'), a checkbox for newsletter updates ('I'd like emails about product offers and company news and events.'), and registration links for 'Register using Google' and 'Register using ORCID'. The entire interface has a dark green background.

LaTeX Demo - Online LaTeX Edit X

https://www.overleaf.com/project/5c47917a4b2bfd6943057549

Room Res Budget Update Leave Request PD Form LTMS - Help TDL - Help RaiderLink ETD - Author Vireo W2W LibApps #general TimeClock Plus Bitly Library Sharepoint

Menu Up Source Rich Text main.tex

LaTeX Demo Recompile

```
1 \documentclass{article}
2 \usepackage[utf8]{inputenc}
3
4 \title{LaTeX Demo}
5 \author{shelley.barba }
6 \date{January 2019}
7
8 \begin{document}
9
10 \maketitle
11
12 \section{Introduction}
13
14 \end{document}
15
```

LaTeX Demo
shelley.barba
January 2019

1 Introduction

LaTeX Demo - Online LaTeX Editor

https://www.overleaf.com/project/5c47917a4b2bfd6943057549

Room Res Budget Update Leave Request PD Form LTMS - Help TDL - Help RaiderLink ETD - Author Vireo W2W LibApps #general TimeClock Plus Bitly Library Sharepoint

Menu

Source Rich Text

LaTeX Demo Recompile

Recompile

LaTeX Demo

shelley.barba

January 2019

1 Introduction

```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{LaTeX Demo}
\author{shelley.barba}
\date{January 2019}

\begin{document}
\maketitle
\section{Introduction}
\end{document}
```

LaTeX Demo - Online LaTeX Editor

https://www.overleaf.com/project/5c47917a4b2bfd6943057549

Room Res Budget Update Leave Request PD Form LTMS - Help TDL - Help RaiderLink ETD - Author Vireo W2W LibApps #general TimeClock Plus Bitly Library Sharepoint

Menu Source Rich Text Recompile

main.tex

```
1 \documentclass{article}
2 \usepackage[utf8]{inputenc}
3
4 \title{LaTeX Demo}
5 \author{shelley.barba }
6 \date{January 2019}
7
8 \begin{document}
9
10 \maketitle
11
12 \section{Introduction}
13
14 \end{document}
15
```

LaTeX Demo

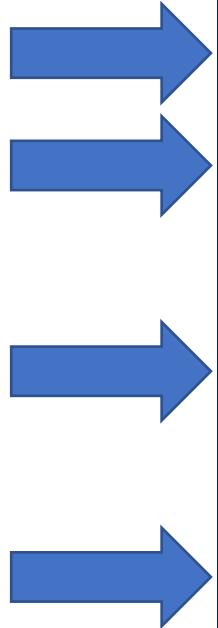
shelley.barba

January 2019

1 Introduction

The screenshot shows the Overleaf LaTeX editor interface. A red circle highlights the 'Source' tab in the top navigation bar. Another red circle highlights the 'Recompile' button, which has three circular arrows indicating a process. A third red circle highlights the vertical scroll bar on the right side of the editor window. A fourth red circle highlights the double-headed arrow icon at the bottom center of the editor area, likely for zooming.

Latex style



```
Source Rich Text\n\\documentclass[conference,twocolumn]{IEEEtran}\n\\usepackage[backend=biber,sorting=none,style=ieee]{biblatex}\n\\usepackage{amssymb}\n\\usepackage[utf8]{inputenc}\n\\usepackage{color}\n\\usepackage{array}\n\\usepackage{graphicx}\n\\usepackage{subfigure}\n\\usepackage{algorithm}\n\\usepackage{amsmath}\n\\usepackage{hyperref}\n\\usepackage{cleveref}\n\\usepackage{algpseudocode}\n\\usepackage{booktabs}\n\\usepackage{float}\n\\usepackage{graphicx}\n\\usepackage{multirow}\n\\usepackage{lettrine}\n\n% Handling refereing using ref2 file\n\\bibliography{ref2}\n\\setcounter{page}{1}\n\n% Anything visible will start from here\n\\begin{document}\n\n% Title\n\\title{Idiopathic Pulmonary Fibrosis regression prediction using Machine learning}\n\n% Authors\n\\author{\n    \\large Amr Essam Aboeleneen \\\\ \n    \\normalsize Qatar University \\\\ \n    \\normalsize aa1405465@qu.edu.qa \\\\ \n}\n\n\\maketitle\n\n% Abstract\n\\begin{abstract}\n    this is the abstract here\n\\end{abstract}\n\n% Sectioning\n\\section{Introduction}\n\\printbibliography\n\\end{document}
```

Packages and
libraries to import
+
Style of writing

Linking referencing
file

Main document
content

Sections example

```
\section{Introduction}
```

```
\section{Related Work}
```

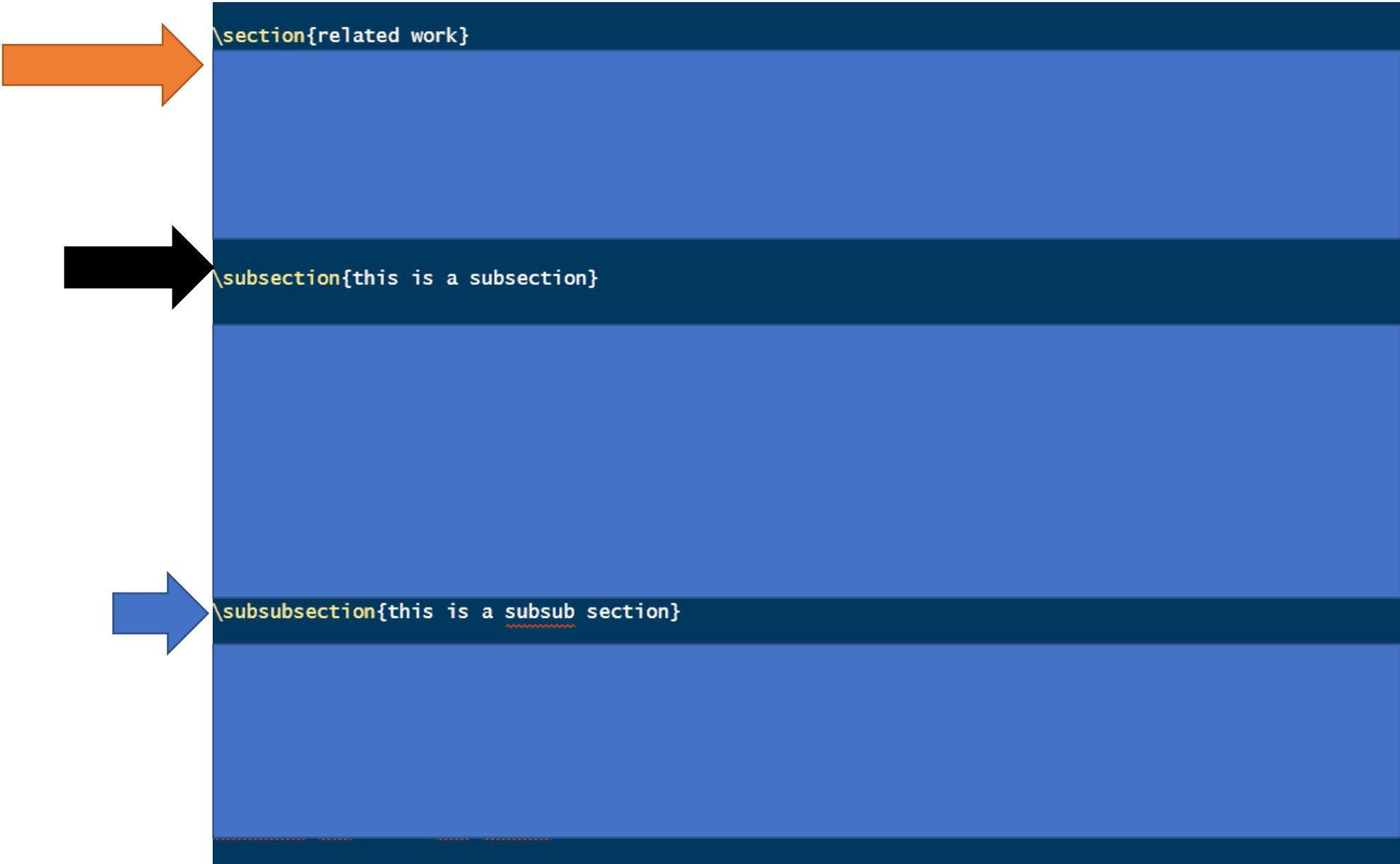
```
\section{Overview}
```

```
\section{Method}
```

```
\section{Experimental Results}
```

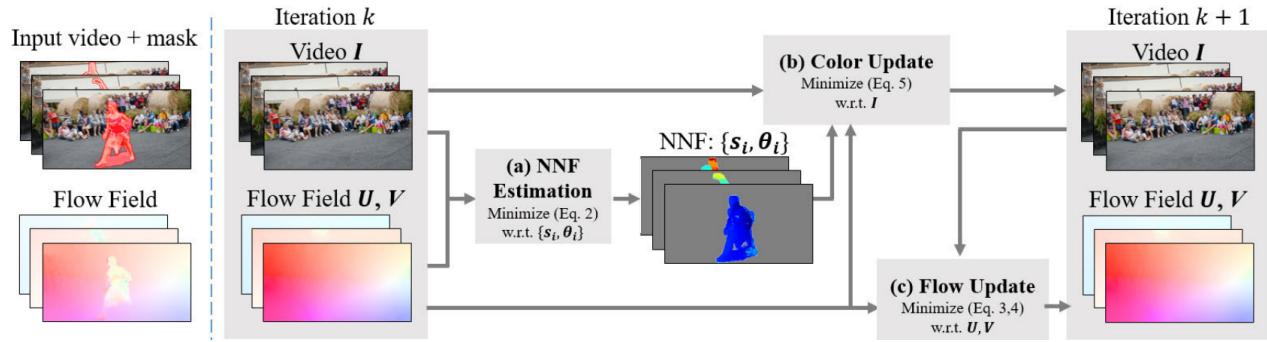
```
\section{Conclusions}
```

Sub sectioning

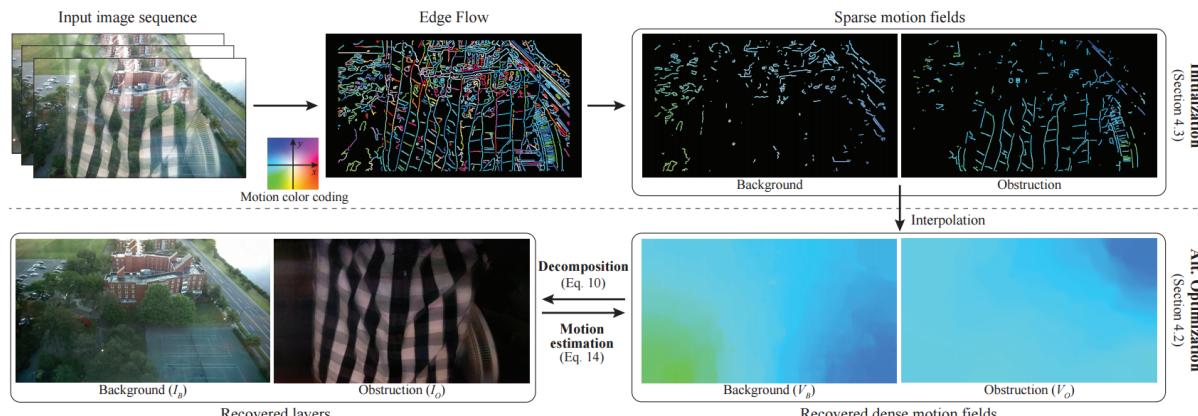


Figures – Overview

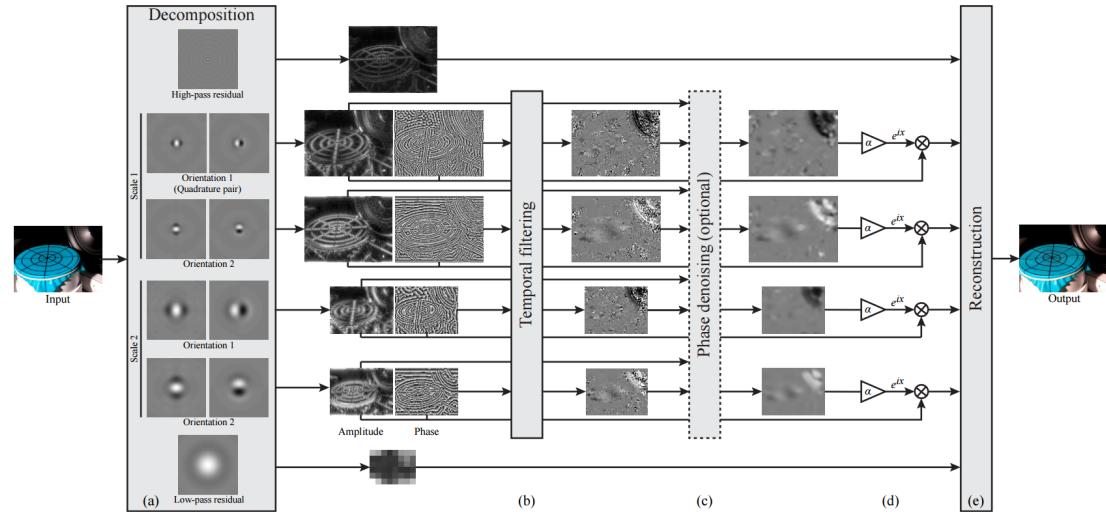
- Visualize the **algorithm**
- Provide forward references to equations and sections



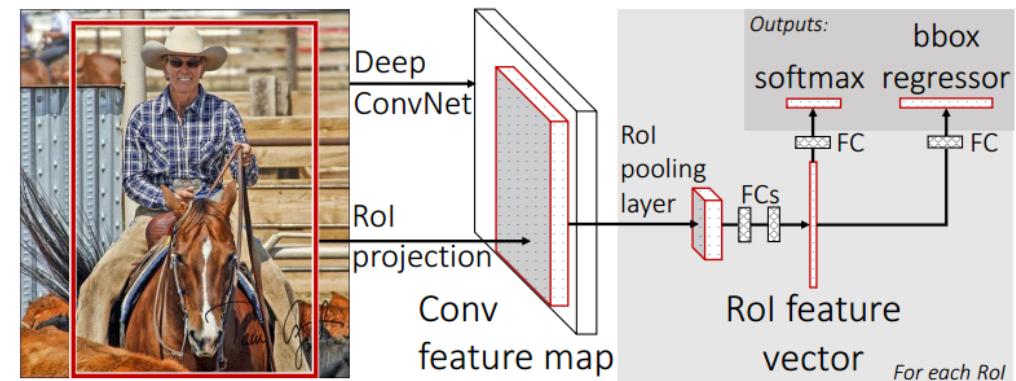
[Huang et al. 2016]



[Xue et al. 2015]



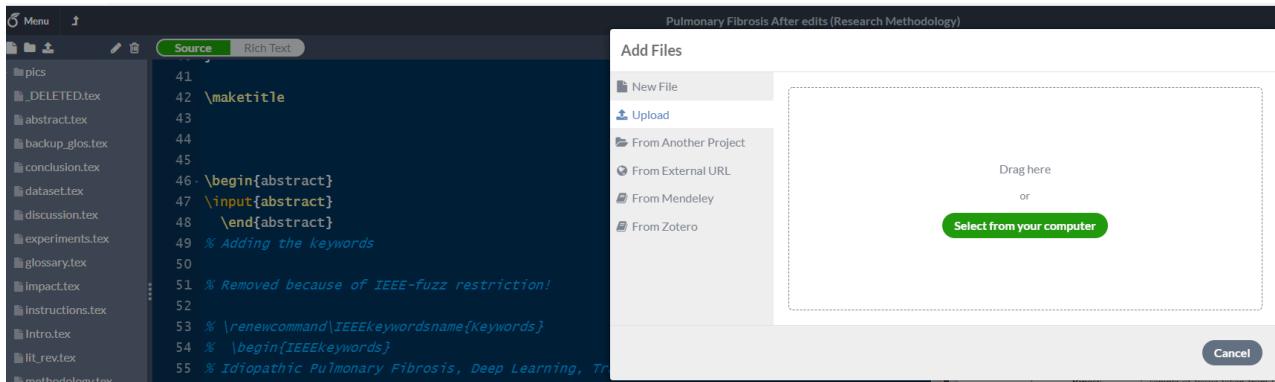
[Wadhwa et al. 2013]



[Girshick 2015]

Figures & tables in latex

1. Upload the image



3. Reference your image

```
\ref{my_label_to_reference}
```

2. Write the caption, label, & others

```
\begin{figure}
```

```
\centering
```

```
\includegraphics{Imagepath}
```

```
\caption{Caption}
```

```
\label{fig:my_label_to_reference}
```

```
\end{figure}
```

Spacing between Images

```
\begin{figure}[t]
```

% Maximum length

```
\includegraphics[width=0.3\linewidth]{A.png} \hfill
```

```
\includegraphics[width=0.3\linewidth]{A.png}
```



(a) 1a



(b) 1b

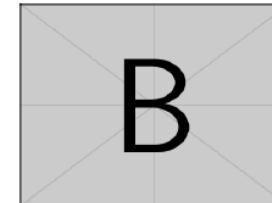
% Equal length

```
\hspace*{\fill}
```

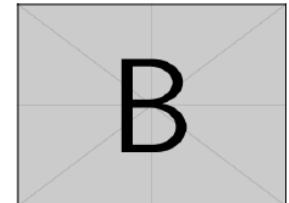
```
\includegraphics[width=0.3\linewidth]{B.png} \hfill
```

```
\includegraphics[width=0.3\linewidth]{B.png}
```

```
\hspace*{\fill}
```



(c) 2a



(d) 2b

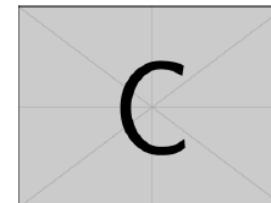
% Fixed length

```
\centering
```

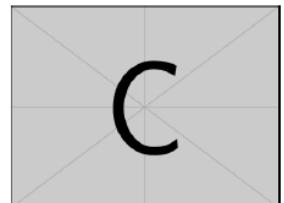
```
\includegraphics[width=0.3\linewidth]{C.png} \hspace{1em}
```

```
\includegraphics[width=0.3\linewidth]{C.png}
```

```
\end{figure}
```



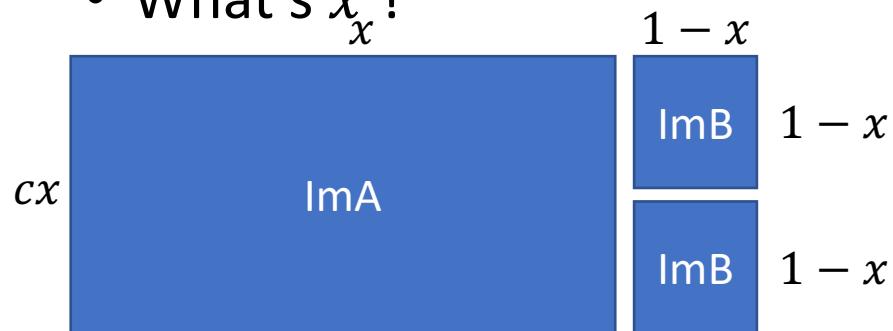
(e) 3a



(f) 3b

Multiple Images

- How do I align images with different sizes?
 - Solve a simple algebra problem
- Suppose we know the image on the left has aspect ratio = $H/W = c$
 - What's x ?



$$cx = 2(1 - x)$$

$$(2 + c)x = 2$$

$$x = 2/(2 + c)$$

```
\setlength{\figa}{0.612\textwidth}
\setlength{\figb}{0.388\textwidth}

\begin{minipage}{\figa}
\includegraphics[width=\linewidth]{ImA.png}
\end{minipage}
\begin{minipage}{\figb}
\includegraphics[width=\linewidth]{ImB.png}
\\
\includegraphics[width=\linewidth]{ImB.png}
\\
\end{minipage}
```

Tables - Basics

```
\begin{table}[t]
  \caption{Table caption} % Table captions are ABOVE the table
  \label{tab:table_name} % Always label the table

  \begin{tabular}{ccl}
    \begin{array}{|c|c|c|c|c|} \hline
      & A & B & C & D & E \\ \hline
      1 & XX & XX & XX & XX & XX \\ \hline
      2 & YY & YY & YY & YY & YY \\ \hline
      3 & & & & & \\ \hline
      4 & & & & & \\ \hline
    \end{array} & c: center, l: left, r: right
  \end{tabular}
\end{table}
```

Easy Shortcut?

[User-friendly LaTeX table generator](#)

The screenshot shows a web-based LaTeX table generator. At the top, there's a toolbar with various icons for styling and table manipulation. Below the toolbar is a preview area showing a 4x5 grid table with columns labeled A through E and rows labeled 1 through 4. The first cell (A1) contains the text "XX" and the last cell (E1) contains "YY". Below the preview is a "Result" section containing the generated LaTeX code:

```
1 | \begin{table}[]
2 |   \begin{tabular}{ccccc}
3 |     \hline
4 |     & A & B & C & D & E \\
5 |     \hline
6 |     1 & XX & XX & XX & XX & XX \\
7 |     \hline
8 |     2 & YY & YY & YY & YY & YY \\
9 |     \hline
10|     3 & & & & & \\
11|     4 & & & & & \\
12|   \end{tabular}
13| \end{table}
```

Below the code are several checkboxes for options like "Escape special TeX symbols (%,&_,#, \$)" and "Smart output formatting". There's also a "Copy to clipboard" button.

Equations

https://latex.codecogs.com/eqneditor/editor.php

Clear Colors... Functions... ⓘ

BoldGreek Upright | $\pm \cap \cup \cdot \therefore \partial \mathbb{P} \angle \ddot{a} \ddot{A} \sqsubset \sqsupset d' d'' \widetilde{abc} \mapsto n \rightarrow$
 $\mp \cup \cap \cup \therefore \mathbb{I} \mathbb{N} \angle \mathbb{a} \mathbb{A} \sqsubseteq \sqsupset \dot{a} \ddot{a} \widehat{abc} \leftarrow \rightarrow$

$x^a \frac{a}{b} \int \bigcap \sum \prod | () || \alpha \beta \gamma \delta | \Gamma \Delta | < > = | \cdots [\cdots] \binom{n}{r}$

F = A \cdot \frac{5}{9}

gif Latin Modern (10pt) Normal 110 Transparent Inline Compressed

$$F = A \cdot \frac{5}{9}$$

Click here to Download Image (GIF)

References

Demo

References management

1. Go to Mendeley , copy your references

☆ Hernafi, Yassine; Ben Ahmed, Mohamed; Bouhorma, Mohammed	ACO and PSO Algorithms for Developing a New Communication Model for VANET Applications in Smart Cities	2017	Wireless Personal Communications	4/14/20
☆ Li, Guangyu; Boukhatem, Lila	Adaptive vehicular routing protocol based on ant colony optimization	2013	VANET 2013 - Proceedings of the 10th ACM Interna...	4/14/20
☆ Zhou, Rong; Lee, Heow Pueh; Nee, Andrew Y.C.	Applying Ant Colony Optimisation (ACO) algorithm to dynamic job shop scheduling problems	2008	International Journal of Manufacturing Research	4/14/20
☆ Yagmahan, Betül; Yenisey	Multi-objective flow shop scheduling problem	2008	Computers and Industrial Engineering	4/14/20
☆ Marimuthu, S.; Ponnambaraju, Jawahar, N.	Ant colony optimization algorithms for scheduling m-machine	2009	Journal of Materials Processing Technology	4/14/20
☆ Blum, Christian	Ant colony optimization with beam search: An application to the quadratic assignment problem	2005	Computers and Operations Research	4/14/20
☆ Stuetzle, Thomas; Hoos, Holger H.	Ant colony search for the traveling salesman problem	1997	Proceedings of the IEEE Conference on Evolution...	4/14/20
☆ Dorigo, Marco; Maniezzo, Alberto	An ant colony system for the Traveling Salesman Problem	1996	IEEE Transactions on Systems, Man, and Cyber...	4/14/20
☆ Dorigo, Marco; Gambardei, Luca	Ant colony learning approach to the traveling salesman problem	1997	IEEE Transactions on Evolutionary Computation	4/14/20
☆ Dorigo, Marco; Stützle, Thomas	Ant colony optimization	2004	IEEE Transactions on Evolutionary Computation	4/14/20
☆ Osman, Ibrahim H.; Kelly, John	Ant colony optimization for the Traveling Salesman Problem	1996	Meta-Heuristics	4/14/20
☆ Larrañaga, P.; Kuijpers, C.R.H.; Inza, I.; Dizdarevic, S.	Ant colony optimization for solving the Traveling Salesman Problem: A review on representations and applications	1999	Artificial Intelligence Review	4/12/20
☆ Negulescu, Alina E.	Ant colony optimization for the Traveling Salesman Problem: A review on representations and applications	2017	U.P.B. Sci. Bull., Series C	4/11/20
☆ Zhou, Yuren	Ant colony optimization algorithm for TSP instances	2009	IEEE Transactions on Evolutionary Computation	4/11/20
☆ Adrian, Angelia Melani; Utamima, Amalia; Hernandez, Luis	A comparative study of GA, PSO and ACO for solving construction site layout optimization problems	2015	KSCE Journal of Civil Engineering	4/7/20

2. Paste them in the references file

```
Source Rich Text
main.tex
ref2.bib

1 @article{Hernafi2017,
2 abstract = {Traffic congestion is a major mobility problem, which generates enormous economic resources and causes serious problems for the most dense of cities. Intelligent transportation systems based on vehicular ad-hoc network (VANET) communications will improve many services, expressively, related to transport, security, reliability, management and including the assistance in the reduction of traffic congestion. In this context, we propose an intelligent system based, firstly, on a new clustering technique to control and maintain the stability of routes during inter-vehicular communications, and secondly, a bio-inspired systematically conducting mobility measurement of agent, intervening in cases of traffic congestion, in order to find new routes to those offered by the global positioning system. Obviously, by providing an appropriate route selection process, such routing concept could be helpful in exchanging control messages to inform the nearest medics willing to give first aid and routing of another alert to the nearest ambulance. Thus, in order to deal with these sophisticated optimization techniques, we evaluate in this article means of simulation experiments. According to that, we have anticipated particular incidents suitable to estimate the pertinence of the proposed system. The analysis and implementation in VANET will be based on three simulators, especially, SUMO, MOVE and NS2. The results prove the effectiveness of the approach by reducing fuel consumption and CO2 emissions along with the rest of pollutant emissions in the case of an incident.},
3 author = {Hernafi, Yassine and {Ben Ahmed}, Mohamed and Bouhorma, Mohammed},
4 doi = {10.1007/s11277-017-4286-0},
5 file = {:::},
6 issn = {1572834X},
```

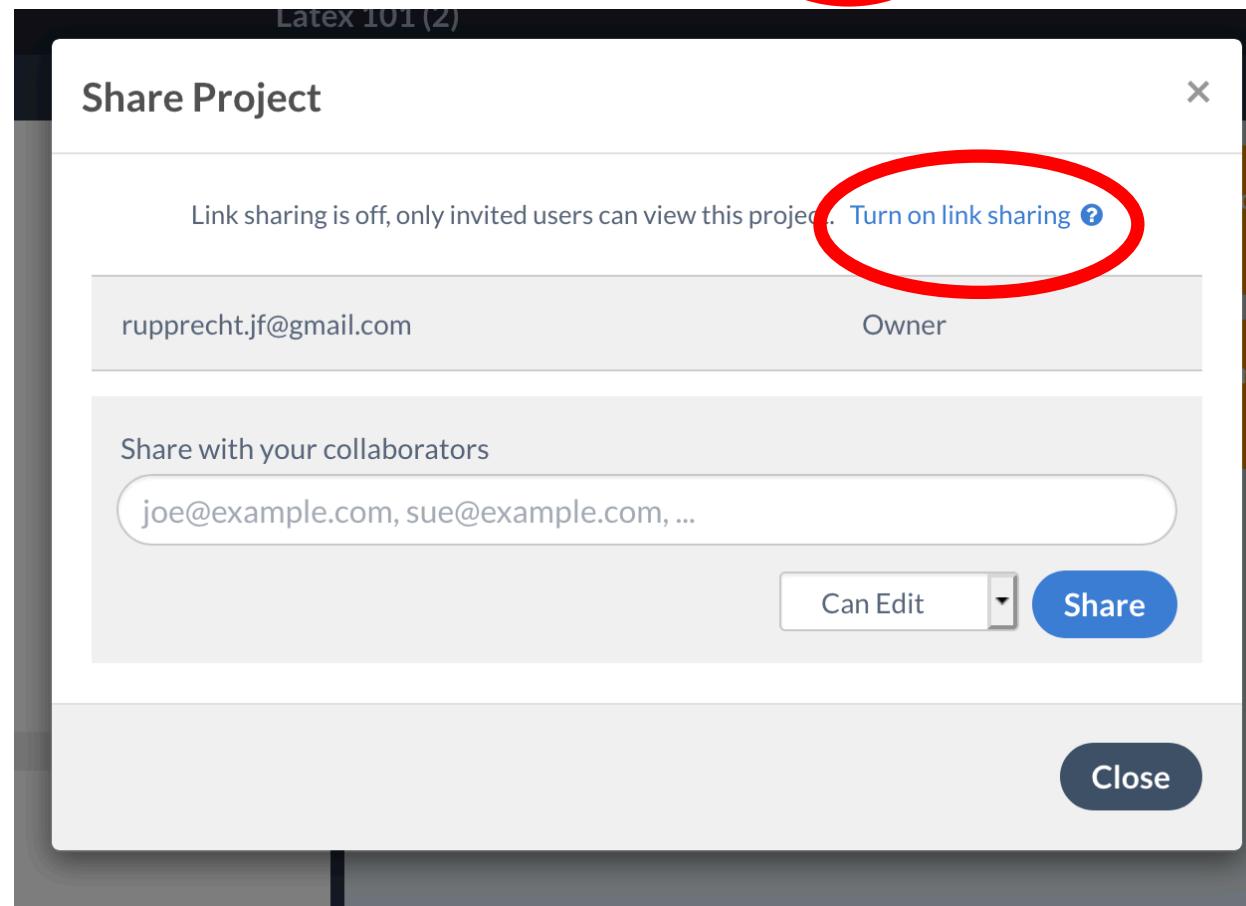
3. Use by :

\cite{}

Bonus : Collaboration & versioning



Collaborating with Overleaf



Version control

Menu



Latex 101 (2)

Review

Share

Submit

History

Chat

Browsing project as of 1...

Label this version

Compare to another version

Download project at this version

All history

Labels

```
1 \documentclass[pre,letterpaper,onecolumn,final,superscriptaddress,floatfix]{revtex4}
2 %%%%%%%%%%%%%%
3 \usepackage[french,english]{babel}
4 \usepackage{graphicx,psfrag,amsmath,amssymb,amsfonts,bbm, latexsym,color,dcolumn,bm,mathbbol}
5 \usepackage[framemethod=tikz]{mdframed}
6 \usepackage{hyperref}
7
8 \usepackage{xcolor}
9 \definecolor{orange}{rgb}{0.25,0.05,0}
10 \definecolor{blue}{rgb}{0,0,0.30}
11
12 % DEFINING NEW COMMANDS
13 \newcommand{\md}{\mathrm{d}}
14 \newcommand{\refn}[1]{Eq. (\ref{#1})}
15 \newcommand{\smartit}[3]{\int^{\#1}_{\#2} \! \mathrm{d} #3 \,}
16 \newcommand{\pa}{\partial}
17
18 % TUNING EXISTING COMMANDS
19 \renewcommand{\labelitemi}{$\cdot$}
20
21 % TUNING EXISTING COMMANDS
22 \usepackage{ifthen}
23 \newcommand{\cverbose}{2} % cverbose = 2: talk
24
25
26
27
```

Today

Edited main.tex

10:25 am • You

Edited main.tex

10:17 am • You

Deleted fig0.png

Deleted fig1.pdf

Created Figure/eveil-musique.jpg

10:12 am • You

Edited main.tex

10:11 am • You

Created main.tex

Created recom.bib

Created fig1.pdf

Created fig0.png

10:10 am • You

Debugging 1

```
43  
44 What do we talk about when we talk about Latex?  
45 \begin{itemize}  
46   \item \color{red}{About text editing};  
47   \item About reference managing (Bibtex);  
48   \item \color{blue}{About unexpected behavior and  
49   \end{itemize}  
50  
\doingitonpurpose  
52
```

The screenshot shows a LaTeX editor interface with a dark theme. At the top, there's a toolbar with a 'Recompile' button, a file icon, and a download icon. Below the toolbar, the main area displays a red error message box and two yellow warning message boxes.

Undefined control sequence. (main.tex, line 51)

The compiler is having trouble understanding a command you have used. Check that the command is spelled correctly. If the command is part of a package, make sure you have included the package in your preamble using `\usepackage{...}`.

[Learn more](#)

I.51 \doingitonpurpose

The control sequence at the end of the top line of your error message was never `\def`'ed. If you have misspelled it (e.g., `\hobx`), type `'l` and the correct spelling (e.g., `\hbox`). Otherwise just continue, and I'll forget about whatever was undefined.

Package frenchb.lfd Warning: Figures' and tables' captions might look like 'Figure 1:' which is wrong in French. Check your class or packages to change this; reported on input line 31. (main.tex, line 31)

Package frenchb.lfd Warning: OT1 encoding should not be used for French. Add `\usepackage[T1]{fontenc}` to the preamble of your document; reported on input line 31. (main.tex, line 31)

[View Raw Logs](#)

[Other logs & files](#)

Algorithms

- See the documentation of [algorithm2e](#)
- Provide the main steps of the algorithm
- Use consistent annotations
- Use references to sections and equations to connect the main texts with the algorithm

Algorithm 1: Proposed video completion algorithm.

Input : Video \mathbf{I} , user-specified mask $\bar{\Omega}$

Output: Completed video \mathbf{I}

```
1 Compute forward/backward flow fields  $\mathbf{U}, \mathbf{V}$  in  $\Omega$ 
2 Initialization: filling hole  $\bar{\Omega}$  in  $\mathbf{I}, \mathbf{U}, \mathbf{V}$  at coarsest scale (Sec. 4.4)
3 for scale  $s$  from 1 to  $n_s$  do
4   for iteration  $k$  from 1 to  $K_s$  do
5     (a) NNF estimation:
6       Minimize Eq. 2 w.r.t.  $\{\mathbf{s}_i, \theta_i\}$ , with  $\mathbf{I}, \mathbf{U}, \mathbf{V}$  fixed.
7     (b) Color update:
8       Minimize Eq. 5 w.r.t.  $\mathbf{I}$ , with  $\mathbf{U}, \mathbf{V}, \{\mathbf{s}_i, \theta_i\}$  fixed.
9     (c) Flow update:
10      Minimize Eqs. 3 and 4 w.r.t.  $\mathbf{U}, \mathbf{V}$ , with  $\mathbf{I}, \{\mathbf{s}_i, \theta_i\}$  fixed.
11   end
12   Upsample  $\mathbf{U}, \mathbf{V}$  using bicubic interpolation.
13   Upsample  $\{\mathbf{s}_i, \theta\}$  using nearest-neighbor interpolation.
14 end
```

THE END

*Thanks for your
attention!*