

Seminar - Data Visualization

HowTo: Paper Writing

SS 2021

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Computer Graphics and Visualization Group
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Scientific vs. Literary Writing

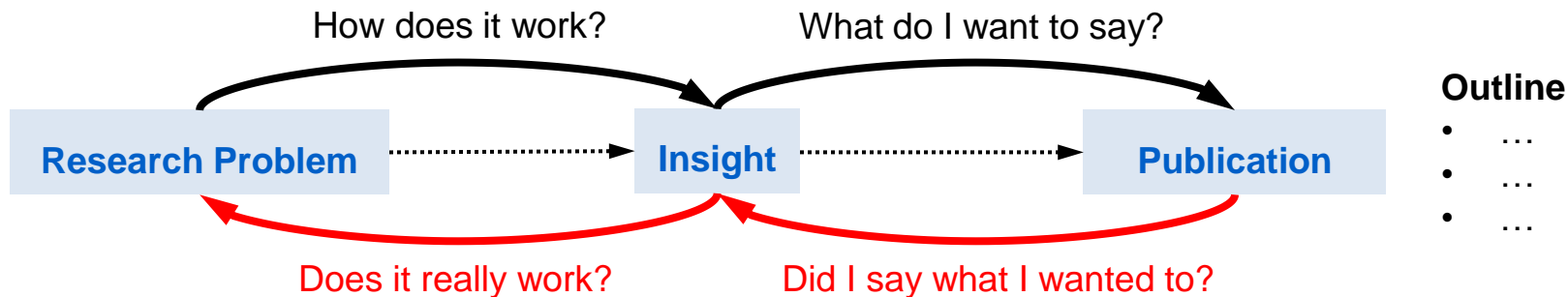
	Literary Writing	Scientific Writing
Aim of the author	<ul style="list-style-type: none">• entertaining the reader• telling a story• provoking deeper thought	<ul style="list-style-type: none">• sharing scientific knowledge• publishing own work• (getting cited)
Style of Writing	<ul style="list-style-type: none">• literary, poetic, lyrical writing• contents may be fictitious• no need (or possibility) to prove the story plot	<ul style="list-style-type: none">• objective, neutral writing• contents based on provable facts• verification of statements through<ul style="list-style-type: none">• experimental evidence• logical reasoning• trustful references

Important Questions when Preparing a Scientific Publication

- **Who am I addressing? What audience will read my text?**
 - Domain scientists? → Answer affects the **style of writing**
 - Broader public? e.g. amount of technical language to use
- **Where/In which format do I want to publish my work?**
 - Bachelor/Master Thesis? → Answer affects **content and outer format**
 - Seminar Paper? e.g. admissible length of publication (seminar: 6 pages)
 - Journal Article?
- **What do I actually want to say???**

Process of Scientific Writing

- Scientific writing is **often bound to a specific topic/problem** → e.g. your seminar topic
- Scientific writing is **an iterative process**



- Start writing **early!**
- **Contact your supervisor**, get feedback and iterate!
- Prepare an **outline** of your ideas, what you have done and what remains to do!

Outline of this Talk

- **Structure of a Scientific Paper**

- Outline of a Research Paper
- Nonlinear Reading Flow
- Structure of the Abstract
- Structure of the Introduction
- Structure of the Conclusion

- **Dos and Don'ts of Scientific Writing**

- Style Guidelines for Scientific Writing
- Dealing with Figures
- Literature Research, Citing and References

- **Writing Tools**

- Literature Research and Acquisition
- Reference Management
- Typesetting and Spellchecking
- Graphing and Plotting

- **Common Mistakes and Grading Criteria**

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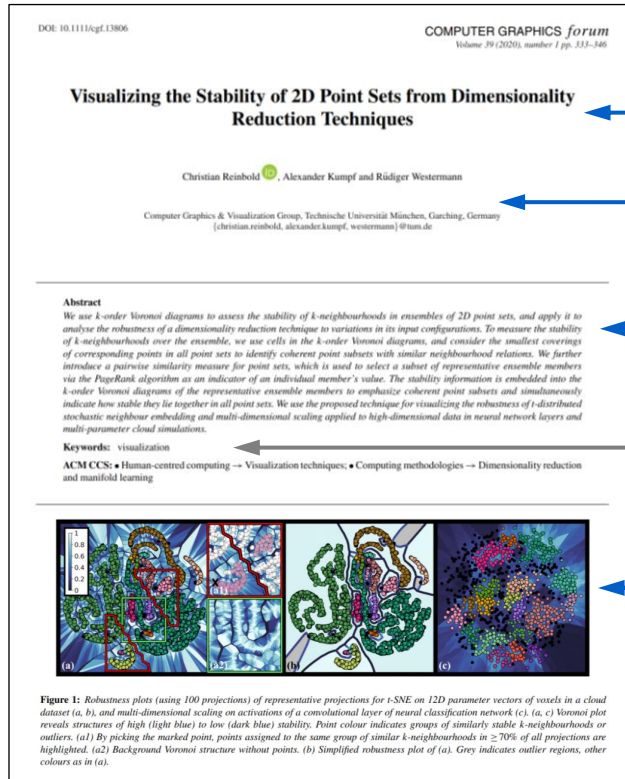
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Outline of a Research Paper – Title Page



Role of the Title Page

- **Conveys first impression** of the paper
- Should **attract the reader** to continue reading

Title

Authors / Affiliations

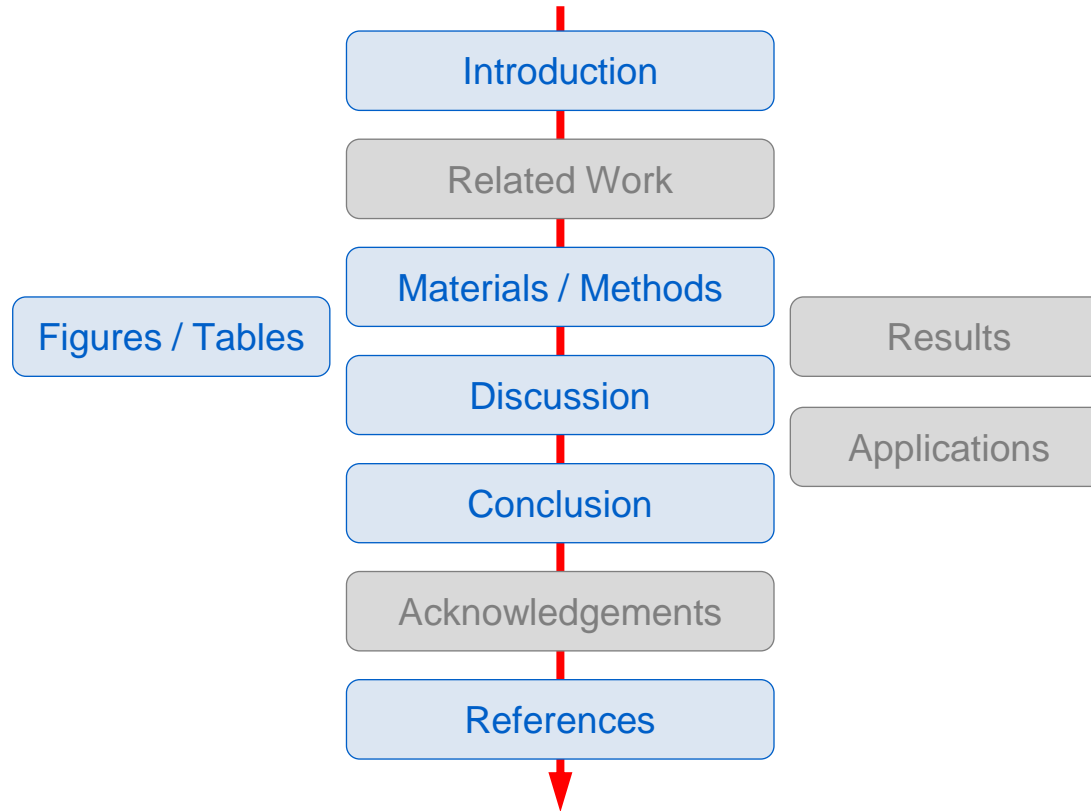
Abstract

Keywords / Classification

Teaser Image

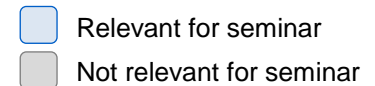
- ☐ Relevant for seminar
- ☐ Not relevant for seminar

Composition of a Research Paper – Paper Body



Role of the Paper Body

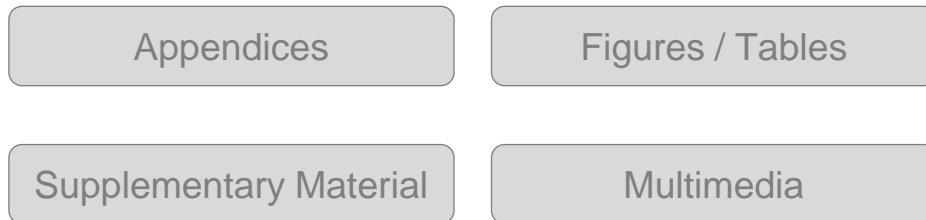
- **Communicates contents** and main ideas of the paper
- Should be written **concisely and largely self-contained**
- **Common Thread** should always be present and easy to follow



Outline of a Research Paper – Supplements

Role of the Supplements

- Contain **additional information** beyond the contents of the actual paper
 - exhaustive figures, tables
 - implementation details
 - animations that cannot be printed
 - ...
- **Paper must be understandable without looking into supplements!**



- ☐ Relevant for seminar
- ☐ Not relevant for seminar

Nonlinear Reading Flow

- Readers need to **filter out** papers that are **irrelevant for them!**

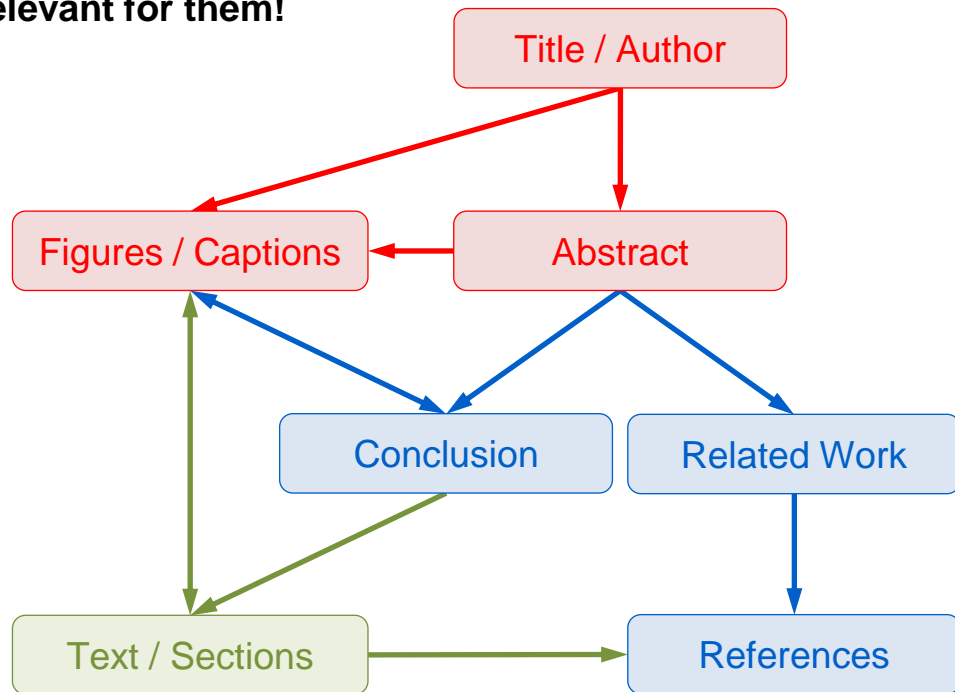
→ Want an **overview of the contents fast!**

→ Read **most distinctive sections first**
and **details only when required!**

Priority:

- Highest
- High
- Moderate

- **References are important!**



Sections of Particular Importance

Abstract

- Conveys first impression of the paper
- **Summarizes the paper in a few sentences** w. r. t. key elements, contributions, and essential ideas

Conclusion

- **Stresses contribution of the paper**
- Summarizes / reviews results and methods (advantages / drawbacks)
- Draw conclusions and presents an **outlook**

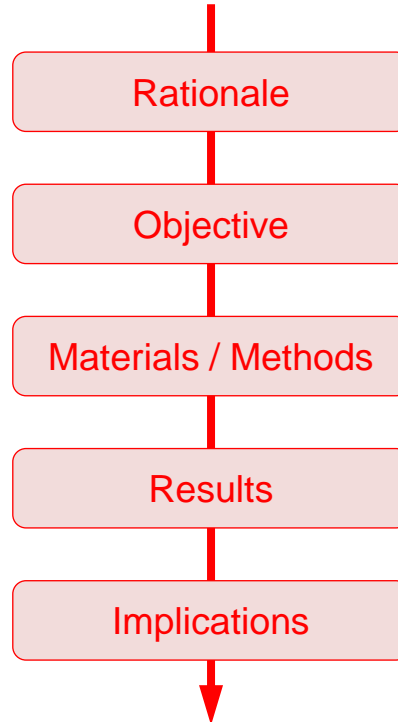
Introduction

- **Explains the problem and key questions** (e.g. to unexperienced readers)
- Introduces **common terms and backgrounds**
- How can your method contribute to the solution of the problem?

Substructure of the Abstract

Role of the Abstract

- Basic introduction / background
- Statement of the general problem
- Presentation of main results
- Explanation of main results in general context
- (Broader) perspective / outlook



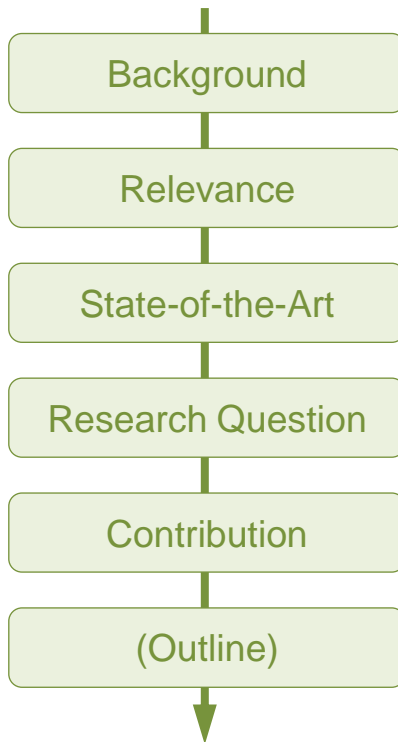
Important Questions

- What is the problem? Why?
- What is the goal?
- How was this goal achieved?
- What are the findings?
- So what? Why should one bother? What's next?

Substructure of the Introduction

Role of the Introduction

- Draw the big picture
- Provide context for following the paper
- Statement of relevance
- Description of State-of-the-Art
- Description of own contribution
- (Outline of the paper)



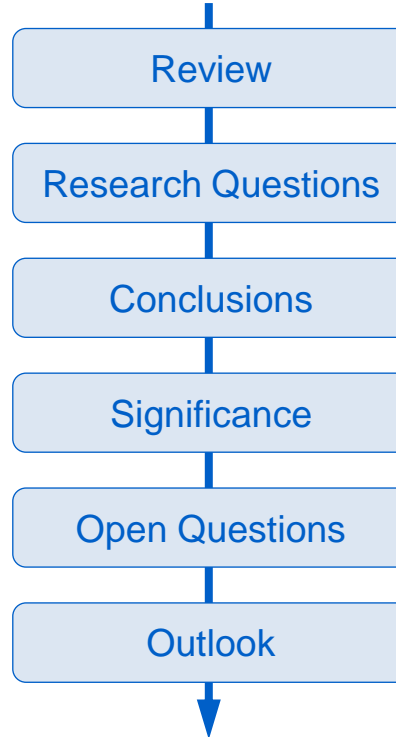
Important Questions

- What is the theory behind the problem?
- Why is this problem relevant in this research field?
- What has been done so far?
What could not be solved?
- What problem / issue am I explicitly addressing?
- How did I solve remaining problems?
- (What is the structure of the paper?)

Substructure of the Conclusion

Role of the Conclusion

- Review of main results
- Relation between results and research questions from the Introduction
- Statement of significance
- Statement of starting points for future work



Important Questions

- What are our main results?
- How are our results related to the research questions mentioned before?
- How did we advance the State-of-the-Art?
- What new insights have been gained by your results? Are they significant?
- Which problems have not or could not be solved?
- What needs to be done in the future?

Take Home Message

- Proper structuring of research papers **simplifies efficient communication** between scientists.
- Respecting the common paper structure **helps readers to better understand your work**.
- Thinking about proper structuring of your paper **helps you to better understand your work**.
- Use your knowledge about the nonlinear reading flow to **attract relevant readers** and **make them read your papers**.
- Readers that find your paper relevant to their own work **will cite your paper** (and read future ones).

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Style Guidelines for Scientific Writing

- Focus on what is **essential**! Avoid **redundancies**!
 - Don't spend time and space for explaining unnecessary things!
 - Explain / Introduce **every concept you need in the paper, but not more**!
 - Explain / Introduce **everything you need, but only once** (unaware but intelligent reader)!
 - Use an **Outline** to organize your ideas and written text!
 - Helps removing unnecessary text sections or figures, as well as repetitive paragraphs.
 - Keep track of the **common thread** of your paper!
 - Think about the **structure of your paragraphs**!
 - Clarify issues / topics of paragraphs for yourself and for the reader!
 - Support statements with **clear and specific examples**!
 - Make facts and arguments **follow a logical sequence**!

Style Guidelines for Scientific Writing

- Be **concise**! Be **specific**! Be **as clear as possible**!
 - Prefer clear and simple formulations!
 - Use **simpler (shorter) sentences** instead of complex constructions!
 - Don't use more words than absolutely necessary!
 - Avoid abusing word forms (e.g. use a noun, where a verb would be clearer)
 - Avoid filling words (generally, basically, actually, however...)!
 - **Make every word tell!**
 - Use **technical language and math typesetting appropriately**!
 - Don't invent new synonyms for predefined technical terms!
 - Be consistent in using nomenclature (don't alternate between multiple terms)!
 - Avoid excessive usage of jargon and math typesetting!

Learning Physical Graph Representations from Visual Scenes

Daniel M. Bear^{1,3,†}, Chaofei Fan^{1,2}, Damian Mrowca², Yunzhu Li⁴, Seth Alter⁵, Aran Nayeib⁶, Jeremy Schwartz⁵, Li Fei-Fei¹, Jiajun Wu², Joshua B. Tenenbaum^{5,4}, and Daniel L.K. Yamins^{1,2,3}

¹Department of Psychology, Stanford University

²Department of Computer Science, Stanford University

³Wu Tsai Neurosciences Institute, Stanford University

⁴MIT CSAIL

⁵MIT Brain and Cognitive Sciences

⁶Neurosciences Ph.D. Program, Stanford University

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Abstract

Convolutional Neural Networks (CNNs) have proved exceptional at learning representations for visual object categorization. However, CNNs do not explicitly encode objects, parts, and their physical properties, which has limited CNNs' success on tasks that require structured understanding of visual scenes. To overcome these limitations, we introduce the idea of "Physical Scene Graphs" (PSGs), which represent scenes as hierarchical graphs, with nodes in the hierarchy corresponding intuitively to object parts at different scales, and edges to physical connections between parts. Bound to each node is a vector of latent attributes that intuitively represent object properties such as surface shape and texture. We also describe PSGNet, a network architecture that learns to extract PSGs by reconstructing scenes through a PSG-structured bottleneck. PSGNet augments standard CNNs by including: recurrent feedback connections to combine low and high-level image information; graph pooling and vectorization operations that convert spatially-uniform feature maps into object-centric graph structures; and perceptual grouping principles to encourage the identification of meaningful scene elements. We show that PSGNet outperforms alternative self-supervised scene representation algorithms at scene segmentation tasks, especially on complex real-world images, and generalizes well to unseen object types and scene arrangements. PSGNet is also able learn from physical motion, enhancing scene estimates even for static images. We present a series of ablation studies illustrating the importance of each component of the PSGNet architecture, analyses showing that learned latent attributes capture intuitive scene properties, and illustrate the use of PSGs for compositional scene inference.

2 Methods

Physical Scene Graphs. Informally, a PSG is a vector-labelled hierarchical graph whose nodes are registered to non-overlapping locations in a base spatial tensor. More formally, for any positive integer k let $[k] := \{0, \dots, k-1\}$. A *physical scene graph* of depth L is a hierarchical graph $\mathcal{G} = \{(V_l, A_l, E_l, P_l) | l \in [L]\}$ in which $V_l = [|V_l|]$ are layer l vertices, $A_l : V_l \rightarrow \mathbb{R}^{C_l}$ are C_l -vector-valued attributes, E_l is the set of (undirected) within-layer edges at layer l , and for $l \in [L-1]$, $P_l : V_l \rightarrow V_{l+1}$ is a function defining child-parent edges. We also require that for some tensor $S \in \mathbb{R}^{H \otimes W \otimes C}$, $V_0 = [H \cdot W]$ and $A_0[W \cdot i + j] = [i, j] \oplus S[i, j, :]$ for $i \in [H]$, $j \in [W]$, and call S the base of \mathcal{G} . Due to the definition of \mathcal{G} , the nodes V_l at any layer define a partition of the base tensor, defined by associating to $v \in V_l$ the set $p(v) = \{(i, j) | \bigcirc_{v' \prec l} Pr((i, j)) = v\}$. We call the map $R_l : v \mapsto p(v)$ the *spatial registration* at layer l . An intuitive depiction of an example PSG is shown in Fig. 1. A *spatiotemporal* PSG is a union $\bigcup_{t=0}^{T-1} \mathcal{G}^t$ of single time-point PSGs, for which: (i) the first attribute of any node encodes its relative timestep, ie. for $v \in V_l^t$, $A_l(v) = [t] \oplus A_l^t(v)$; and, (ii) for $t_1 < t_2 \in [T]$, we have a (possibly empty) set of *tracking edges* $T_l^{t_1, t_2} \subset V_l^{t_1} \times V_l^{t_2}$.

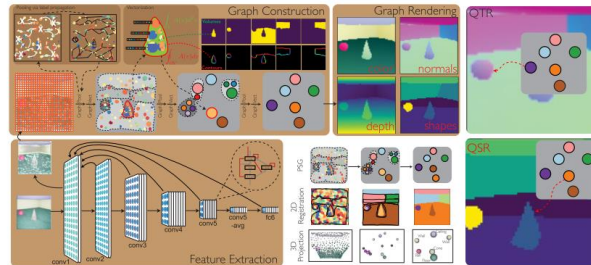


Figure 1: Overview of the Physical Scene Graph (PSG) representation and its construction and decoding by PSGNet. Brown boxes indicate the three stages of PSGNet: (1) Feature Extraction from visual input with a ConvRNN, (2) Graph Construction from ConvRNN features, and (3) Graph Rendering for end-to-end training. Graph Construction consists of a pair of learnable modules, Graph Pooling and Graph Vectorization, that together produce a new, higher PSG level from an existing one. The former dynamically builds a partition of pooling kernels over the existing graph nodes as a function of learned, pairwise node affinities (thresholded to become within-level graph edges, top left); the latter aggregates node statistics over the image regions (and their boundaries) associated with each pooling kernel to produce attribute vectors for the new nodes. Details of each stage and module are given in the Supplement. Three levels of an example PSG are shown (center, bottom) along with its quadratic texture (QTR) and shape (QSR) rendering (right).

Style Guidelines for Scientific Writing

- Be **objective**! Stay **neutral**!
 - Avoid personal ratings!
 - Eliminate phrases like: *it makes sense, important, good / bad*
 - Avoid unnecessary adjectives!
 - Don't use slang and colloquial language!
 - *eliminate / remove* instead of *get rid of*
 - Prove your statements with logical arguments and trustful references / sources!
 - Show, don't tell!
 - Prefer **peer-reviewed publications** (e.g. online journals, text books)!
 - **Websites, blogs, Wikipedia, ... are in general not peer-reviewed and not trustful!**

Style Guidelines for Scientific Writing

- Pay attention to **tenses**!
 - Things that happened in the past need **past tense**!
 - *Data were collected...*
 - *Models have been implemented...*
 - Things that continue to happened require **present tense**!
 - *This paper is structured as follows ...*
 - *We examine ...*
 - Be **consistent** in using tenses!
- Pay attention to **abbreviations**!
 - Write out abbreviations the first time they appear in the text!
 - *Video Random Access Memory (VRAM)*

Style Guidelines for Scientific Writing

- Use **active** and **passive** constructions!
 - **Don't use first person perspectives** (I will explain, I show, ...)!
 - Use **we** (meaning the authorship of the paper): *We show ..., We demonstrate...*
 - Use the **passive**: *The method will be described / can be found in ...*
 - Use the **active**: *This paper deals with..., The figure shows..., Results indicate...*
 - Avoid *we* when being a single author (fortunately rarely the case for real papers)...

VOLUME 35, NUMBER 21

PHYSICAL REVIEW LETTERS

24 NOVEMBER 1975

Two-, Three-, and Four-Atom Exchange Effects in bcc ^3He

J. H. Hetherington and **F. D. C. Willard**

Physics Department, Michigan State University, East Lansing, Michigan 48824

(Received 22 September 1975)

We have made mean-field calculations with a Hamiltonian obtained from two-, three-, and four-atom exchange in bcc solid ^3He . We are able to fit the high-temperature experiments as well as the phase diagram of Kummer *et al.* at low temperatures. We find two kinds of antiferromagnetic phases as suggested by Kummer's experiments.



Felis Domesticus
Chester Willard

Style Guidelines for Scientific Writing

- Pay attention to **spelling and grammar!**
 - **Language proficiency matters!**
 - Your supervisors are **not** there to teach you English or German!
 - Use spell checking and grammar checks!
 - Ask native speakers for help!
- **Feedback for you will be more valuable**, if supervisors can **focus on contents** rather than on **language mistakes!**

Deep Learning-based Grammar Checking – Grammarly (for example)

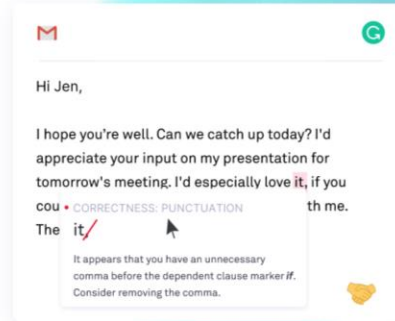
Great Writing, Simplified

Compose bold, clear, mistake-free writing with Grammarly's AI-powered writing assistant.

Add to Chrome It's free

★★★★★ 34,000+ Chrome store reviews

30 million people use Grammarly to improve their writing



Dealing with Figures

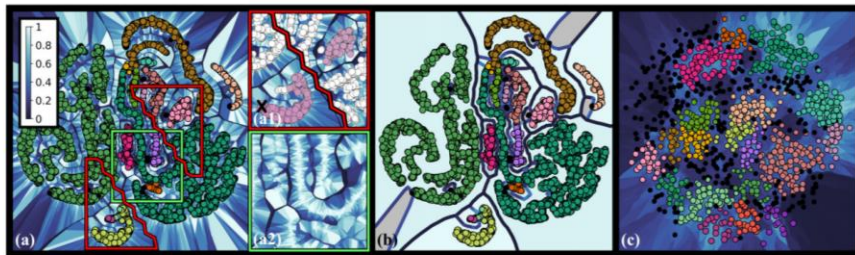


Figure Display

Figure Caption

Figure 1: Robustness plots (using 100 projections) of representative projections for t-SNE on 12D parameter vectors of voxels in a cloud dataset (a, b), and multi-dimensional scaling on activations of a convolutional layer of neural classification network (c). (a, c) Voronoi plot reveals structures of high (light blue) to low (dark blue) stability. Point colour indicates groups of similarly stable k-neighbourhoods or outliers. (a1) By picking the marked point, points assigned to the same group of similar k-neighbourhoods in $\geq 70\%$ of all projections are highlighted. (a2) Background Voronoi structure without points. (b) Simplified robustness plot of (a). Grey indicates outlier regions, other colours as in (a).

- Good figures can replace lengthy text descriptions.
- Well-chosen figures **support the text**, but must not explain everything!
- Figures should be **large enough** to enable the reader to see the finest details, **without wasting space!**
- Figures should be **densely filled** with information, **without overwhelming the reader!**

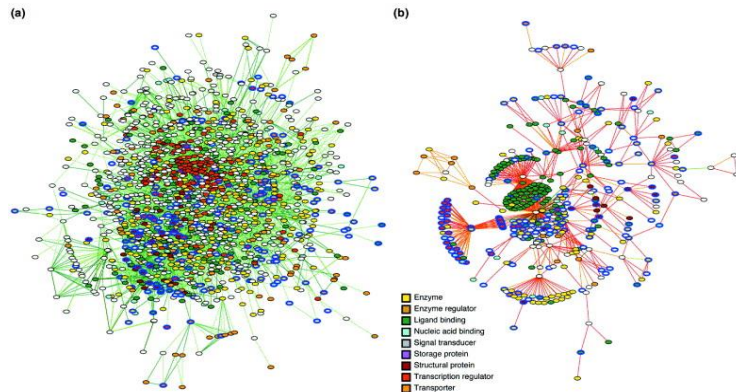
Dealing with Figures - Captions and Annotations

Figure 1: Robustness plots (using 100 projections) of representative projections for t-SNE on 12D parameter vectors of voxels in a cloud dataset (a, b), and multi-dimensional scaling on activations of a convolutional layer of neural classification network (c). (a, c) Voronoi plot reveals structures of high (light blue) to low (dark blue) stability. Point colour indicates groups of similarly stable k-neighbourhoods or outliers. (a1) By picking the marked point, points assigned to the same group of similar k-neighbourhoods in $\geq 70\%$ of all projections are highlighted. (a2) Background Voronoi structure without points. (b) Simplified robustness plot of (a). Grey indicates outlier regions, other colours as in (a).

- The caption should contain **enough information to understand the figure**, while being **as short as possible!**
- First sentence describes the **key elements of the figure!**
- **Avoid redundancy** between text and figure captions!
- Font size must be appropriate to guarantee readability!
- Preparing figures and captions **before** writing the main text helps organizing the text!

→ Consider nonlinear reading flow when writing figure captions

Dealing with Figures – Figure Display



- **overloaded and cluttered**
- content unclear
- visually not really appealing

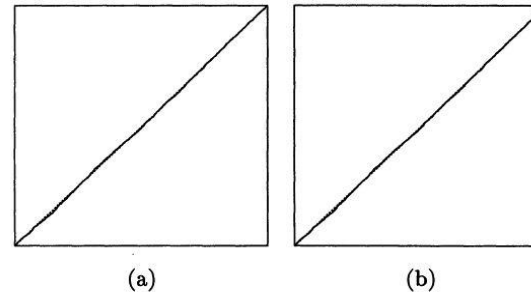


Figure 1. SRQ Plots of T_1/T_n (Vertical Axes) Against i/n (Horizontal Axes) for the Gibbs Sampler (a) and an Alternating Gibbs/Independence Sampler (b) for the Pump Failure Data Based on Runs of Length 5,000. Lines through the origin with unit slope are shown dashed; axis ranges are from 0 to 1 for all axes.

- axis labels missing
- lots of white space
- **hardly any information**

Dealing with Figures - Illustrative Example

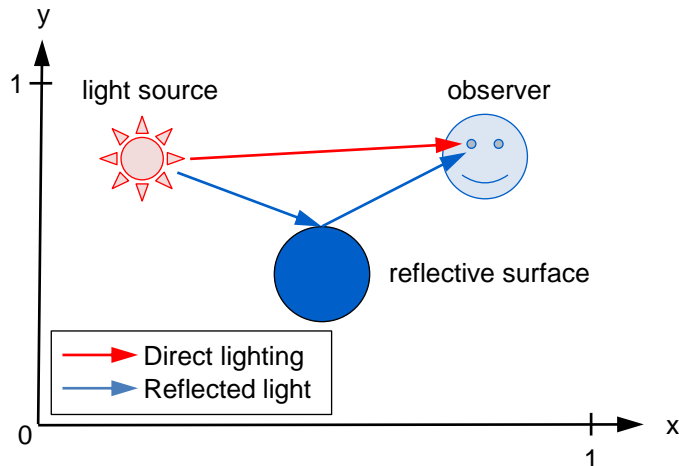
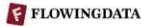


Figure 1: Schematic of light transport in presence of reflective surfaces. Light coming from a point-like light source reaches the observer directly or is reflected before doing so.

- What does the figure show?
 - What do the symbols mean?
 - How is the figure related to the text?
-
- Use **expressive figure captions!**
 - Use **annotations!**
 - Use **legends!**
 - Use **axis labels and scales** (if relevant)!
 - **Refer to the figure in your text!**

Dealing with Figures – More Nice Examples



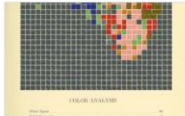
About Newsletter Projects Tutorials Courses

Become a Member / Log in

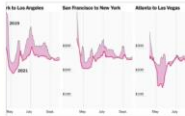
Visualization

Showing the stories in data through statistics, design, aesthetics, and code.

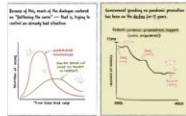
<https://flowingdata.com/category/visualization/> (18/04/2021)



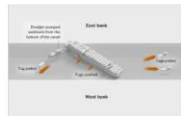
Generate a color analysis by uploading an image
Mel Dellison and Lisa Daly made a fun interactive that lets you upload...



Tracking airfare as a proxy for summer travel plans
Quoc Trung Bui and Sarah Kliff for NYT's The Upshot used difference charts to...



Stopping a pandemic before it starts
For Politico, Beatrice Jin provides an illustrated guide on stopping a pandemic before...



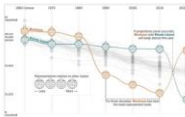
How the Ever Given got unstuck
The Washington Post illustrated how the Ever Given got stuck and was freed...



Coronavirus variant tracker
For Axios, Will Chase, with illustrations by Brendan Lynch, provides the current status...



GDP and vaccination rates
For The New York Times, Keith Collins and Josh Holder look at the...



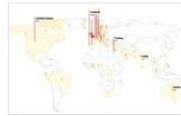
How your state might lose or gain representation with census count
Harry Hironaka, Tara Imhoff, and Ted Mellnik for The Washington Post look at...



Visualizing risk of Johnson & Johnson vaccine side effect
As the Johnson & Johnson vaccine pauses in the United States, Philip Bump...



Domestic terrorism incidents plotted over time
The Washington Post (spwall) shows the recent rise in domestic terrorism incidents...



Rise of a variant in the U.K.
As you likely know, there are coronavirus variants around the world. Rosten mapped...



Guess who the neighborhood voted for
NYT's The Upshot has a quiz that puts you in a neighborhood via...



Make the Ever Given get stuck anywhere
The Ever Given got stuck in the Suez Canal. It was refueled. So...



Vaccine efficacy rates explained
You explain efficacy rates and why the best vaccine is the one you...



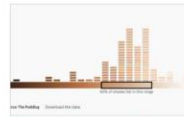
Collecting reports of anti-Asian hate crimes
The New York Times collected, categorized, and linked to reports of anti-Asian hate...



Stores that closed on famous shopping streets
Pre-pandemic, we walked around shopping areas casually browsing, but a lot of retail...



Steer through the Suez Canal
To better understand the challenge of steering a giant container ship through the...

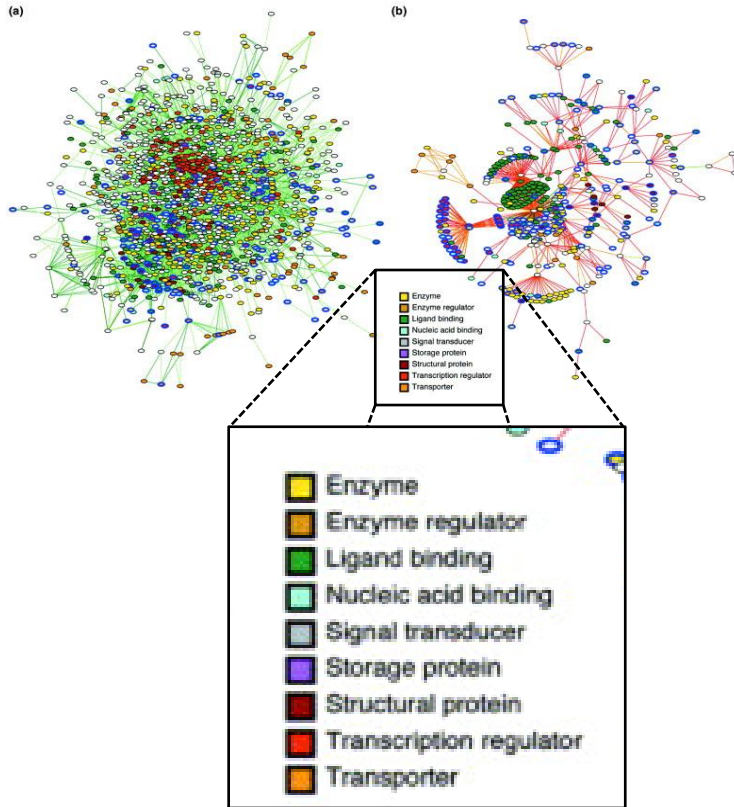


Analysis of color names used with makeup
For The Pudding, Ofunne Amaka and Amber Thomas looked at shades, words, and...



What if a giant banana was orbiting Earth
yeti dynamics imagined if a giant banana were orbiting Earth from the same...

Dealing with Figures – Pixel Graphics vs. Vector Graphics Formats



- Pixel-based graphics formats (.png, .jpg, .bmp, ...) **are not zoom invariant!**
 - Text and figure contents may appear blurry.
- **Avoid zooming and scaling graphics!**
 - Plotting tools typically allow you to generate figures directly matching the target size.
 - Also helps to maintain consistent font sizes between figures.
- Vector-graphics formats (.pdf, .eps, .svg, ...) may be larger in memory but **can cope with zooming!**
(though still font size will change)

Literature Research, Citing and References

- Your **supervisors** will provide you with **primary literature** on your topic, **but this is not all...**
- You are expected to read papers and do literature research **on your own!**

- Look for literature!
- Read papers!
- Build yourself an overview of your topic!
- **Decide what is relevant!**
- **Discuss with your supervisor!**

- Try nonlinear reading yourself!
- Reading papers helps you to improve your style of writing!

Google Scholar

☒ Articles ☐ Case law

Articles about COVID-19

CDC	NEJM	JAMA	Lancet	Cell	BMJ
Nature	Science	Elsevier	Oxford	Wiley	medRxiv

Stand on the shoulders of giants

<https://scholar.google.com/>

Citation Styles

- Typical reference style: Author – Year or Date – (Paper or Book) Title – Journal or Publisher
- Typical citation style: varies...

Type 1: Author - Year

a)

far. The reasons for this may be both a lack of suitable tools covering the specific needs of the geophysical community and that the available advanced visualization techniques are hardly known in this community (Hibbard et al. 2002; Nocke et al. 2008). Analyses were performed by Macêdo et al. (2000), who explored multivariate ocean-atmosphere datasets using the XGobi software tool (Swayne et al. 1998). In Doleisch et al. (2004), the interactive visual field exploration tool SimVis (Doleisch et al. 2003) was used to visualize a simulated meteorological dataset of the Hurricane Isabel, which struck the U.S. East Coast in 2003. SimVis was then later also applied to climate model data and to reanalysis datasets by Kehrér et al. (2008) and Ladstädter et al. (2009), showing the ability of the tool to explore large climate datasets. Hobbs et al. (2010) showed the benefits

REFERENCES

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- Doleisch, H., and H. Hauser, 2002: Smooth brushing for focus + context visualization of simulation data in 3D. *Proc. WSCG, Plzeň, Czech Republic, Eurographics*, 147–154.

b)

The concept was next extended to 3D shapes, yielding a wide family of variations, including surface skeletons [SBTZ02], curve skeletons [CSM07], and centerlines [WLK*02, AB02].

Type 2: Numeric

To simulate global shadow effects for real-time rendering, methods computing shadow volumes [2] and deep shadow maps [22], [9] have been presented. These methods sample the volumetric occlusion from the light sources utilizing efficient precomputed data structures. To include scattering effects Ropinski et al. [31] compute a volumetric representation for each light source using a slice-based volume renderer. While these methods are efficient for a single static light source, moving the light source or adding additional light sources require a recomputation of the shadow representation, leading to poor frame rates for dynamic lightning environments.

REFERENCES

- [1] K. Beason, J. Grant, D. Banks, B. Futch, and M. Hussaini, "Pre-Computed Illumination for Isosurfaces," *Proc. IST/SPIE Symp. Electronic Imaging*, pp. 98–108, 2006.
- [2] U. Behrens and R. Ratering, "Adding Shadows to a Texture-Based Volume Renderer," *Proc. IEEE Symp. Volume Visualization*, pp. 39–46, 1998.
- [3] A. Ben-Artzi, K. Egan, F. Durand, and R. Ramamoorthi, "A Precomputed Polynomial Representation for Interactive Brdf Editing with Global Illumination," *ACM Trans. Graphics*, vol. 27, no. 2, pp. 1–13, 2008.
- [4] J. Birn, *Digital Lighting and Rendering*, second ed. New Riders, 2006.
- [5] P. Desgranges and K. Engel, "Fast Ambient Occlusion for Direct Volume Rendering," US Patent Application 2007/0013696 A1, 2007.

Special Cases of Citing References

- Figures taken from the literature
 - When reproducing **figures identically**:
 - Cite authors in caption: *From Mustermann (1995, Fig. 3)*
 - Typically requires consent of the Authors
 - When **figures were altered**:
 - Cite authors in caption: *Adapted from Mustermann (1995, Fig. 3)*
- **Online materials**
 - **Typically not peer-reviewed! Potentially not trustful!** (e.g. never cite Wikipedia...)
 - If trustful:
 - Author / Editor of webpage, Title, URL, **DOI**, Date last modified, Date accessed on

Take Home Message

- Pay attention to the **common thread** and **motivate** why your contents are interesting and relevant!
- Content > Format, but **style matters**.
- Respecting common style guidelines **improves clarity of your writing** and **helps readers to better understand your work**.
- Realize the seminar as a chance to **practice scientific working**, i.e. clear and objective writing, as well as logical and well-founded argumentation.
- Make use of the **feedback provided by your supervisors**, but also **respect their time and commitment**.

Outline of this Talk

- **Structure of a Scientific Paper**

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- **Dos and Don'ts of Scientific Writing**

- Style Guidelines for Scientific Writing
- Dealing with Figures
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- **Writing Tools**

- Literature Research and Acquisition
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- Typesetting and Spellchecking
- Graphing and Plotting

- **Common Mistakes and Grading Criteria**

Literature Research – Google Scholar

<https://scholar.google.com/>

The image shows a screenshot of the Google Scholar homepage with several annotations. On the left, the Google Scholar logo and a search bar are visible. Below the search bar, there are links to various journals and a section titled 'Articles about COVID-19'. In the center, there is a search bar with the text 'visualizing the stability of 2d point sets'. Below the search bar, there are filters for 'Any time', 'Since 2021', 'Since 2020', 'Since 2017', and 'Custom range...'. There are also sorting options: 'Sort by relevance' and 'Sort by date'. Below these, there are checkboxes for 'Include patents' and 'Include citations', and a 'Create alert' button. On the right, there are three article listings. The first article is 'Visualizing the Stability of 2D Point Sets from Dimensionality Reduction Techniques' by C Reinbold and A Kumpulainen, published in Computer Graphics in 2020. The second article is 'Visualizing the stability of critical points in uncertain scalar fields' by M Mihai and R Westermann, published in Computers & graphics in 2014. The third article is 'Pointnet++: Deep hierarchical feature learning on point sets in a metric space' by C.R. Qi, L. Yi, H. Su, and J. Guibas, published in arXiv preprint arXiv:1706.02413 in 2017. Annotations include: 'Filtering' pointing to the 'Include patents' and 'Include citations' checkboxes; 'Sorting' pointing to the 'Sort by relevance' and 'Sort by date' options; 'Related Papers' pointing to the 'Related articles' links in the article listings; 'Reference Export' pointing to the 'Cited by' links in the article listings; and 'Document Links' pointing to the '[PDF]' links in the article listings.

Google Scholar

visualizing the stability of 2d point sets

Articles

About 48.600 results (0,12 sec)

Any time

Since 2021

Since 2020

Since 2017

Custom range...

Sort by relevance

Sort by date

☐ Include patents

☒ Include citations

☒ Create alert

Visualizing the Stability of 2D Point Sets from Dimensionality Reduction Techniques

C Reinbold, A Kumpulainen - Computer Graphics ..., 2020 - Wiley Online Library

We use k-order Voronoi diagrams to assess the **stability** of k-neighbourhoods in ensembles of **2D point sets**, and apply it to analyse the robustness of a dimensionality reduction technique to variations in its input configurations. To measure the **stability** of k ...

☆ 99 Cited by 1 Related articles All 3 versions

[PDF] wiley.com

Visualizing the stability of critical points in uncertain scalar fields

M Mihai, R Westermann - Computers & graphics, 2014 - Elsevier

... Special Section on Uncertainty and Parameter Space Analysis in **Visualization**. **Visualizing the stability** of ... Overviews of uncertainty **visualization** approaches are given, for instance, by Grietho and ... however, no methods have been proposed to analyze and **visualize** the possible ...

☆ 99 Cited by 16 Related articles All 5 versions

[PDF] psu.edu

Pointnet++: Deep hierarchical feature learning on point sets in a metric space

C.R. Qi, L. Yi, H. Su, J. Guibas - arXiv preprint arXiv:1706.02413, 2017 - arxiv.org

... Single scale **point** grouping is **visualized** here. For details on density adaptive grouping, see Fig. 3 ... In Fig. 8 we **visualize** what has been learned by the first level kernels of our hierarchical network ... in the **visualization**. 5 Related Work ...

☆ 99 Cited by 2640 Related articles All 6 versions >>

[PDF] arxiv.org

Sorting

Filtering

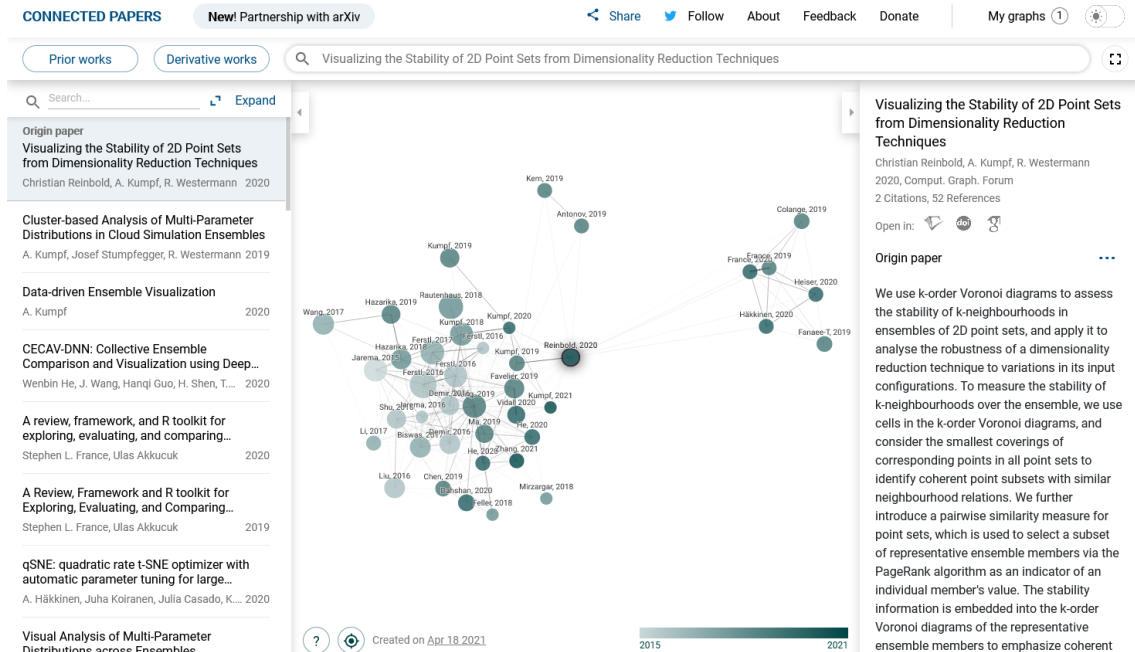
Related Papers

Reference Export

Document Links

Literature Research – Other Research Resources

- Research Gate
- Semantic Scholar
- Scholarpedia
- ...
- Connected Papers: <https://www.connectedpapers.com/>



Literature Acquisition

- **Not all papers are freely available!**
- Use eAccess provided via TUM University Library! – <https://www.ub.tum.de/en/eaccess>

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eAccess
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Technische Universität München



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Publishing & Citing

About the Library

eAccess

Are you on the road or at home? eAccess is a convenient way to use electronic media the University Library at the TUM has under licence. These include electronic e-journals, e-books and databases. eAccess is web based and requires no plug-ins, client software or a special browser settings.

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Overview

[Who can use eAccess? →](#) [E-Tutorials →](#)

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Who can use eAccess?

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- ☐ TUM Guests
- ☐ Private Persons and External Library Users

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WhatsApp +49 173 861 8412
information@ub.tum.de

Contact

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eaccess@ub.tum.de

eAccess

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- Opening Hours
- Branch Libraries
- FAQ Current Situation

Corona: Current Information

Ordering, borrowing, returning
Check-out of pre-ordered media possible at the branch libraries Main Campus, Mathematics & Informatics, Straubing, and Weißenstephan. Returns at the open branch libraries or by mail, no matter where originally checked out. [Read more](#)

After logging in:

eAccess – E-Medienzugang der Universitätsbibliothek

Sie suchen	Link	Hinweise
Elektronische Zeitschriften	EZB	Die EZB listet lizenzierte und kostenfreie eJournals auf. Die EZB eignet sich vor allem, für den schnellen Zugriff auf Zeitschriften, deren Titel Sie bereits kennen. Für eine thematische Recherche nach Artikeln sollten Sie den OPACplus oder unsere Datenbanken nutzen.
Datenbanken	DBIS	DBIS listet lizenzierte und kostenfreie Datenbanken auf, zu denen Sie an der TUM Zugriff haben. In Datenbanken finden Sie Aufsätze aus Zeitschriften und Kongressschriften, Dissertationen, Statistiken, Fakten und vieles mehr. DBIS eignet sich gut, wenn Sie sich einen Überblick über die relevanten Datenbanken in Ihrem Fachgebiet verschaffen wollen oder wenn Sie bereits wissen in welcher Datenbank Sie recherchieren wollen.
Artikel und eBooks	OPACplus	Im OPACplus können Sie gleichzeitig nach Artikeln und Büchern suchen. OPACplus eignet sich vor allem für die Suche nach Medien, die an der Universitätsbibliothek als Volltexte zur Verfügung stehen. Für eine detaillierte thematische Recherche empfehlen wir Ihnen unsere Datenbanken.
eBooks	OPAC	Im OPAC finden Sie alle Medien, die die Universitätsbibliothek besitzt, insbesondere alle eBooks. Nicht recherchierbar sind Artikel aus Zeitschriften, Büchern oder Kongressbänden. Der OPAC eignet sich vor allem für die Suche nach eBooks.

Kontakt

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eaccess@ub.tum.de

[Logout](#)

Durch Verwendung eines Bookmarklets können Sie eAccess noch komfortabler nutzen!

Ein systematischer Download von Daten ist aus lizenzrechtlichen Gründen nicht gestattet.

Reference Management

- Organizing your references can quickly become tedious with growing number of references!
- Consider using automated reference management solutions!**

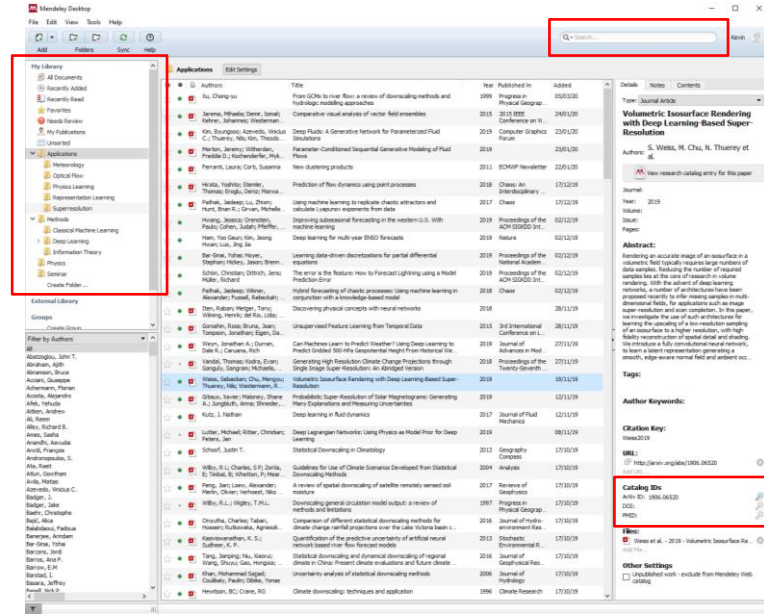
→ Also helps with preparing the reference list for your paper! (LaTeX: .bib-file)

- Free solutions:

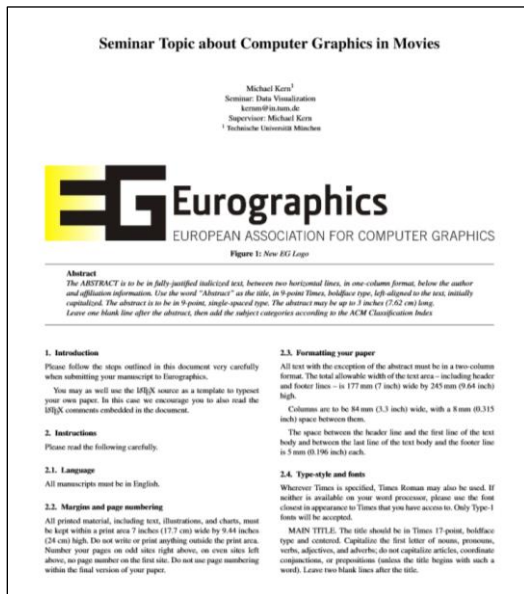
- JabRef
- Mendeley (for example)**
- ...

- Commercial solutions (maybe free via TUM):

- Citavi
- EndNote
- ...



- **Use our LaTeX template!**



- LaTeX is a typesetting software well-suited for scientific writing
- Use LaTeX distribution on your local machine or online via

TUM overleaf access

- Online advantage: Paper accessible from everywhere...
- Online Disadvantage: System may fail sometimes...

- **Make sure to backup your data!!!**
- Though LaTeX is very good for writing mathematical formulae, don't overdo it...

Simple Tutorial:

- <https://www.overleaf.com/latex/learn/free-online-introduction-to-latex-part-1.pdf>
- <https://www.overleaf.com/latex/learn/free-online-introduction-to-latex-part-2.pdf>

Web-Services:

- Sharelatex: <https://de.sharelatex.com/>
- Overleaf: <https://www.overleaf.com/>
- TUM-Internal: <https://latex.tum.de/ldap/login>

Wiki:

- <https://en.wikibooks.org/wiki/LaTeX>
- https://en.wikipedia.org/wiki/Help:Displaying_a_formula

Typesetting – Title of Your Paper

- **Leave it with the standard format!**
- Update it with **your personal details** and the **name of your supervisor!**

Max Mustermann

Seminar: Data Visualization

muster@in.tum.de

Supervisor: Mustafa Maxmann

Technical University of Munich

- Don't remove the line "Supervisor: ...".

Graphing and Plotting

- Useful tools for script-based plotting and graphing:
 - Python-based
 - Matplotlib
 - Seaborn
 - Bokeh, Plotly for interactive plotting
 - ...
 - R-based
 - <https://www.r-graph-gallery.com/>
 - Native LaTeX
 - Tikz (great for producing simple vector graphics or combining images within LaTeX)
- Others: Gimp (free), InkScape (free), commercial solutions, ...

Take Home Message

- Make use of LaTeX and our **EG Layout template!**
- Alter the template only if you really **need** to do so!
- Concerning the remaining tools, **try out what suits you best...**

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- **Common Mistakes and Grading Criteria**

“**Fake News**”

“**Alternative Facts**”



<https://www.zdf.de/assets/donald-trump-19-3176797-ap-sauli-niinisto-100-768x432?cb=1570088675839>, (18/04/2021)



https://de.wikipedia.org/wiki/Kellyanne_Conway#/media/Datei:Kellyanne_Conway_by_Gage_Skidmore_3.jpg, (18/04/2021)

- **Prove all your statements!**
- Be **precise** in what you want to say!
- Be **critical** in selecting your references!
- Be sure to **understand the contents of your references** correctly!

Common Mistakes – Paper Format

- Check **spelling and grammar**!
 - Use spellchecking and grammar checking software
 - Ask for help from native speakers!
- Check **section and page numbering**!
 - Use automatic typesetting solutions
- Avoid format errors!
 - Double-check LaTeX formatting!
 - Comply with the given format!
 - Check correctness of **line breaks and page breaks**!
 - **Avoid excessive white space** within your document!

Topic of the Papper
Max Mutterman
Seminar
muster@in.tum.de

2. Introudction

This is text with mainy typos This is suddenly a new sentence.

...

1. Content

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, **sed** diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam **et** justo duo dolores et ea rebum. **THISISALONGSCIENTIFTERM** will be explained in the following.

Common Mistakes – Figure Format

- Choose figure size reasonably!
 - Don't cover half a page with one single image.
 - Choose figure size appropriately to reflect the content and relevance of the image!
- Don't waste space!
 - Focus on what is essential!
 - Crop images to only the interesting regions!
 - Show multiple images in one column!
- Add informative image captions!
 - Describe all contents of the figure, also subfigures!

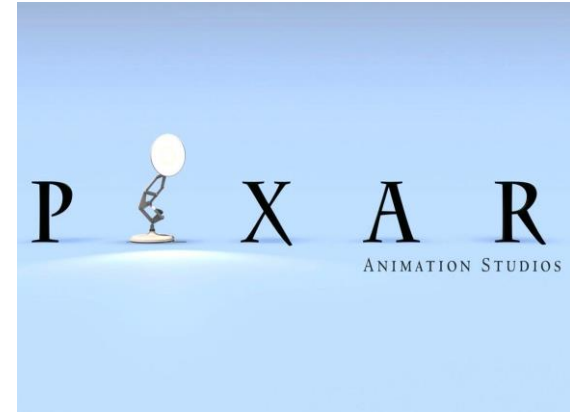


Figure 1: This is an image about something with Pixar animation studios.

Lorem ipsum dolor sit amet, **this is the actual text someone might be interested in** consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores.

Common Mistakes – Personal Notes

- **Remove personal notes** before the submission!

Example:

Research Paper

Variation in Melanism and Female Preference in Proximate but Ecologically Distinct Environments

Zachary W. Culumber ✉, Christian E. Bautista-Hernández, Scott Monks, Lenin Arias-Rodriguez, Michael Tobler

First published: 12 July 2014 | <https://doi.org/10.1111/eth.12282> | Citations: 7

Although association preferences documented in our study theoretically could be a consequence of either mating or shoaling preferences in the different female groups investigated (should we cite the crappy Gabor paper here?), shoaling preferences are unlikely drivers of the documented patterns both because of evidence from previous research and inconsistencies with *a priori* predictions. Our methods closely followed those of published mate choice experiments in this system (Tobler et al. 2009a,b; Plath et al. 2013), and association time is a standard metric of mate

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TODO: what the hell does this mean?

Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet.

Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et iusto odio dignissim qui blandit praesent luptatum zzril delenit augue dui dolore te feugait nulla facilisi (shorten this sentence for the final submission)

Grading Criteria

- Scientific content
 - Does your paper cover the **key elements and basic concepts** of your topic?
 - Did you point out the **relevance of your topic in the broader context** of computer graphics / visualization?
- Correctness of **references and citing practice**
- Replicability / reproducibility of the contents
- Consistency of paper structure
- **Scientific style of writing**
- Compliance with our layout restrictions
 - Usage of EG Layout Template (LaTeX)
 - Paper length 6 pages (incl. references)

Grading Criteria – Guideline Questions

- Is the problem / topic described **clearly, objectively and specifically**?
- Does the work **point out the most important questions** of the topic?
- Does the work **answer the most important questions**?
- Are there sufficiently many **relevant examples**, which support the understanding?
- Is there enough **background information** for inexperienced readers?
- Are the facts **proved correctly**?
- Is there redundancy in the text?
- Are all important terms and mathematical variables **defined and explained appropriately**?
- Do **figure captions** describe the figures sufficiently?
- Do the section / subsections correctly represent and **structure the text**?
- Is there a **common thread**, which enables the reader to follow the paper easily?

Questions?

Student: I don't understand why my grade was so low. How did I do on my research paper?

Teacher: Actually, you didn't turn in a research paper. You turned in a random assemblage of sentences. In fact, the sentences you apparently kidnapped in the dead of night and forced into this violent and arbitrary plan of yours clearly seemed to be placed on the pages against their will. Reading your paper was like watching unfamiliar, uncomfortable people interacting at a cocktail party that no one wanted to attend in the first place. You didn't submit a research paper. You submitted a hostage situation.

When the deadline is nigh:

