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Paper Structure

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Overview

- Motivation
- Structure of Scientific Papers

Overview

- **Motivation**
- Structure of Scientific Papers

Motivation

What is a Scientific Paper?

- *"A written and published report describing original research results."* Day (1983)

Important Aspects

- original research results
- written
- published

Motivation

Reasons for Writing (Booth et al., 1995)

- conservation of knowledge
  - correct reproduction requires written notice
- increased understanding
  - writing requires to structured the topic, leads to better understanding
- gaining perspective
  - writing implies looking at the topic from different points of view

Motivation

Additional Reason for Scientist to Publish their Work (Stock, 2000)

- scientific communication (essential for scientific progress)
- protection of intellectual property
- personal reputation (including a high number of citations)

Motivation

Practical Reasons (Derntl, 2014)

- contracts and salary of established researchers often depend on their publication record
- PhD researchers are required to publish a certain number of papers

Motivation

Learning to Write a Scientific Paper

- publishing is an integral part of academic life
- writing is not every researcher's favourite activity, and getting a paper published can be a very tedious and time-consuming process (Derntel, 2014)
- but: scientific writing can be learned by practice and following some simple guidelines

Overview

- Motivation
- **Structure of Scientific Papers**
  - Title
  - List of Authors
  - Abstract
  - Introduction
  - Body
  - Discussion
  - References

Structure of Scientific Papers

- scientific papers follow a standard form and structure
- form may vary by type of paper
  - e.g. a case study is presented in a different form from a survey paper
- but: basic building blocks are similar
- enables to read a paper on different levels
  - title
  - title and abstract
  - entire paper

Hourglass Model (Swales, 1993)

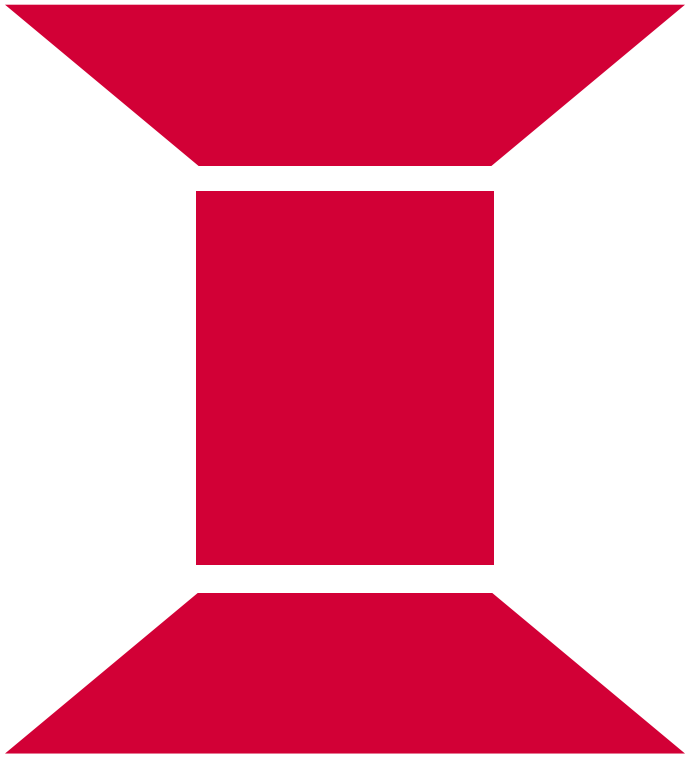
Research Papers Comprise Three Core Parts

- Introduction
  - leads from general motivations to a specific research question
- Body
  - provides detailed description of research methods and results
- Discussion
  - draws general conclusions and present implications from the results

Hourglass Model (Swales, 1993)

Research Papers Comprise Three Core Parts

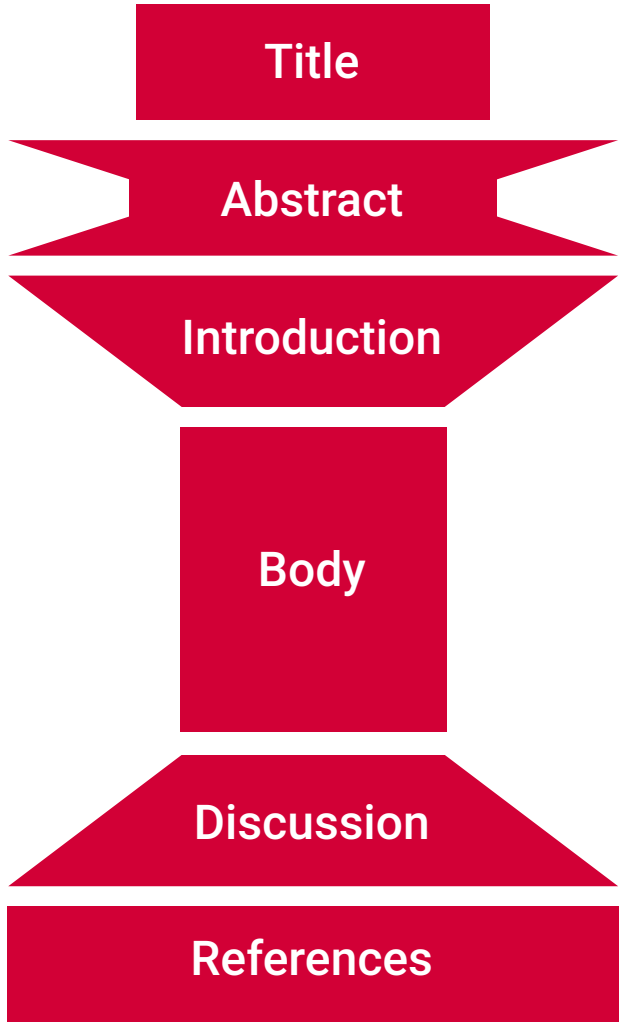
- Introduction
- Body
- Discussion



King Model (Derntl, 2014)

Extension of the Hourglass Model with

- Title
- Abstract
- References



Overview

Hourglass Model	King Model	Complete Structure	Purpose
	Title	Title	describes contents
		Authors	recognizes writers
	Abstract	Abstract	summary of what was done
		Key Words (optional)	supports identification in abstracting and indexing services
Introduction	Introduction	Introduction	explains the problem
Body	Body	Methods	explains how the data were collected
Body	Body	Results	describes what was discovered
Conclusion	Conclusion	Discussion	discusses the implications of the findings
		Acknowledgements	gives credit to those who helped conducting the research
	References	References	recognizes previously published work
		Appendices (optional)	additional information for expert readers

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Title

- most read part of a paper
  - sometimes the only thing that is read
- accuracy of the title important for finding relevant literature
  - search engines and indexing databases use keywords for identifying relevant articles

Title

What is a Good Title?

> *"the fewest possible words that adequately describe the contents of the paper"* (Day, 1983)

- titles that are too long
  - usually contain too many unnecessary words
  - e.g., "Investigations on" at the beginning
- titles that are too short
  - usually use words which are too general
  - e.g., "Writing Reports" lacks information of the kind of reports the paper is focusing on

Title

Criteria of Effective Titles (Peat et al., 2002)

- identify the main issue of the paper
- begin with the subject of the paper
- are accurate, unambiguous, specific and complete
- do not contain abbreviations and jargon
  - only exception: terms well known by the target audience
  - e.g. HTML or CPU in computer science papers
- attract readers

Title

Types of Titles (Jamali and Nikzad, 2011)

- Descriptive Titles
- Declarative Titles
- Interrogative Titles
- Compound Titles

Title

Descriptive Titles

- describe the contents of the paper
- e.g., “Investigating the Role of Academic Conferences on Shaping the Research Agenda“

Title

Declarative Titles

- make a statement about the results presented in the paper
- e.g., “Academic Conferences Shape the Short-Term Research Agenda“

Title

Interrogative Titles

- pose a question
- e.g., “Do Academic Conferences Shape the Research Agenda?“

Title

Compound Titles

- combine two or more of the aforementioned types
- usually separated by colons or question marks
- e.g., “Do Academic Conferences Shape the Research Agenda? An Empirical Investigation“

Title

Examples: Titles of Published Papers (Derntl, 2014)

Educational Technology and Culture:
The Influence of Ethnic and Professional Culture
on Learners' Technology Acceptance

- compound title (mostly descriptive)
- relatively long (15 words)
- but: does not reveal findings of the study

Title

Examples: Titles of Published Papers (Derntl, 2014)

HT06, Tagging Paper, Taxonomy, Flickr, Academic Article, to Read

- descriptive title (unusual, but interesting)
- background information
  - paper is about tagging
  - published at the Hypertext Conference in 2006 (HT06)
- uses a list of tags as its title (including a reference to the conference)
- stands out in a table of contents and might therefore attract readers

Title

Examples: Titles of Published Papers (Derntl, 2014)

A New Framework for Dynamic Adaptations and Actions

- descriptive title
- reveals little about the content
- fairly unspecific as it does not clarify what kinds of adaptations and actions are dealt with
  - unless this is clear in the target community, the title should include some declarative pieces
  - e.g., what characteristics does the framework expose other than that it is ‘new’?

Title

Examples: Titles of Published Papers (Derntl, 2014)

Go To Statement Considered Harmful

- declarative title
- rather short
  - likely to be meaningless to non-computer scientists
- background information
  - title of an influential paper published by Edsger Dijkstra in 1968
- refers to a common practice that is suboptimal as being ‘considered harmful’
  - ‘considered harmful’ has since been adopted for many other papers

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List of Authors

- include all people who have made an intellectual contribution to the research
- order of names is important
- usually, authors are ordered according to their contribution
  - author who contributed most is named first (also: corresponding author)
- but: order can vary from discipline to discipline

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Abstract

- one-paragraph summary of the whole paper (around 150 words)
- summarize the problem, the method, the results, and the conclusions
- rule of thumb: everything of relevance to potential readers should be in the abstract, everything else not
- should be written last so that it accurately reflects the content of the paper

Abstract

Importance of a Good Abstract

- abstracts become increasingly important
  - abstracts are shown (for free) in many electronic databases
  - based on the abstract, readers decide whether or not to read (buy) the whole paper
- a well written and attractive abstract is a key part of every paper

Abstract

How to Write a Good Abstract

- many guidelines and checklists on how to write an abstract, e.g.,
  - Koopman, P.: How to Write an Abstract
    http://www.ece.cmu.edu/~koopman/essays/abstract.html
  - Procter, M.: The Abstract
    https://advice.writing.utoronto.ca/types-of-writing/abstract/
- guidelines might vary slightly by the field of research and type of publication
- however: thematic scope is usually the same and similar to the structure of the complete paper (cf. Hourglass Model)

Abstract

Parts and Structure of an Abstract

- Motivation
- Problem Description
- Objective of the Paper
- Methods
- Results
- Discussion
- Conclusion

Abstract

Motivation

- purpose: show why you are working on the topic
- brief synopsis of the introduction (background information)
- goal: attract interest of your reader
- if possible, refer to socioeconomic or scientific relevance of the work

Abstract

Problem Description

- purpose: explain why existing things do not work
- what motivated you as a writer to go a new way?
- Example: “Even though many researchers have followed this protocol, its numerical values of decisive parameters are imprecise and may lead to systematic simulation errors.“

Abstract

Objective of the Paper

- purpose: precisely state the aim of the paper
- use a linking adverb that logically connects the aforementioned problem statement
- Example: “Thus, the aim of this paper is …“

Abstract

Methods

- purpose: precisely explain what you did
- provide enough detail that others can reproduce your experiment

Abstract

Results

- describe what you found
- state the most significant results

Abstract

Discussion

- discuss or interpret your findings

Abstract

Conclusion

- purpose: provide your opinion towards your work
- synopsis of the post important points to be learned from the paper
- “take-home“ message for the reader => what did you want them to learn, e.g.,
  - “This research improves …“
  - “This research will revolutionize …“
- provide a clear standpoint towards your research
  - even if the reader might disagree, it is important to stand up for your work

Abstract

Structure, Formatting and Content

- usually one sentence for every part
- often written in a single paragraph
- only part of the publication, where you can mix tenses in a paragraph
- some things that should **not** be included in an abstract (Day, 1983)
  - information and conclusions not stated in the paper
  - references to other literature
  - the exact title phrase
  - tables and figures
  - exact phrases that appear later in the introduction

Abstract: Exercise (Derntl, 2014)

Unsupervised Auto-tagging for Learning Object Enrichment

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Abstract. An online presence is gradually becoming an essential part of every learning institute. As such, a large portion of learning material is becoming available online. Incongruently, it is still a challenge for authors and publishers to guarantee accessibility, support effective retrieval and the consumption of learning objects. One reason for this is that non-annotated learning objects pose a major problem with respect to their accessibility. Non-annotated objects not only prevent learners from finding new information; but also hinder a system's ability to recommend useful resources. To address this problem, commonly known as the cold-start problem, we automatically annotate specific learning resources using a state-of-the-art automatic tag annotation method: *α-TaggingLDA*, which is based on the Latent Dirichlet Allocation probabilistic topic model. We performed a user evaluation with 115 participants to measure the usability and effectiveness of *α-TaggingLDA* in a collaborative learning environment. The results show that automatically generated tags were preferred 35% more than the original authors' annotations. Further, they were 17.7% more relevant in terms of recall for users. The implications of these results is that automatic tagging can facilitate effective information access to relevant learning objects.

Keywords: Metadata Generation, User Study, LDA, Cold-Start, Recommender Systems.

1 Introduction

Learning strategies have shifted from a solitary activity to a collaborative web-based one [2]. In collaborative learning systems, digital collections of educational materials or Learning Objects (LOs), such as, lecture videos, notes and presentations, are made available in online repositories. Online learners are not only able to browse or search for LOs, but also enrich this content with value-added metadata.

Learning object enrichment is crucial within a collaborative setting. For example, consider a scenario in a collaborative environment where a user wants to retrieve specific documents related to their interests and uses tags to navigate to the associated resources. Ideally, if the system can effectively provide good tag coverage over the resources, the user can better navigate through document objects and be steered to the relevant resources in the system. On the contrary, if tags are either unclear, not specific for the resource, noisy, or ambiguous, then users cannot retrieve or easily locate resources. Unfortunately, the latter situation is all too common. Since users typically only

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Paper Interfaces for Learning Geometry

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Abstract. Paper interfaces offer tremendous possibilities for geometry education in primary schools. Existing computer interfaces designed to learn geometry do not consider the integration of conventional school tools, which form the part of the curriculum. Moreover, most of computer tools are designed specifically for individual learning, some propose group activities, but most disregard classroom-level learning, thus impeding their adoption. We present an augmented reality based tabletop system with interface elements made of paper that addresses these issues. It integrates conventional geometry tools seamlessly into the activity and it enables group and classroom-level learning. In order to evaluate our system, we conducted an exploratory user study based on three learning activities: classifying quadrilaterals, discovering the protractor and describing angles. We observed how paper interfaces can be easily adopted into the traditional classroom practices.

Keywords: Paper interfaces, Sheets, Cards, Geometry learning, Tabletop

1 Introduction

Geometry education in primary schools is a domain ripe for exploiting the possibilities of computers, as they allow for an easy exploration of the problem space. However, there are some constraints which make it difficult to effectively utilize computers in a classroom scenario. Particularly, they do not cover the entire curriculum, which is based on pen and paper. For example, the only way for children to learn how to draw an arc is by using a physical compass.

Paper interfaces can prove to be an effective solution to this dilemma, as paper is already situated and integrated in the classroom environment and its practices. In addition, paper is cheap to produce, yet persistent and malleable to adapt to the dynamics of the classroom. As a computer interface it can transform into a dynamic display capable of computing and processing data. Besides these benefits of paper interfaces, paper has different properties and affordances depending upon its material, shape and size. Also, many interface metaphors such as cut-copy-paste, files and folders, check-boxes etc. are actually inspired by practices involving paper. Effective identification of these properties followed by a proper utilization, might render the paper interface intuitive for the users to interact. We hypothesize that geometry education in primary schools can greatly

Abstract: Exercise (Derntl, 2014)

	Title: Unsupervised Auto-Tagging for Learning Object Enrichment	Title: Paper Interfaces for Learning Geometry
Motivation	An online presence is gradually becoming an essential part of every learning institute. As such, a large portion of learning material is becoming available online.	Paper interfaces offer tremendous possibilities for geometry education in primary schools.
Problem	Incongruently, it is still a challenge for authors and publishers to guarantee accessibility, support effective retrieval and the consumption of learning objects. One reason for this is that non- annotated learning objects pose a major problem with respect to their accessibility. Non-annotated objects not only prevent learners from finding new information; but also hinder a system's ability to recommend useful resources.	Existing computer interfaces designed to learn geometry do not consider the integration of conventional school tools, which form the part of the curriculum. Moreover, most computer tools are designed specifically for individual learning; some propose group activities, but most disregard classroom-level learning, thus impeding their adoption.
Solution	To address this problem, commonly known as the cold-start problem, we automatically annotate specific learning resources using a state-of-the-art automatic tag annotation method: α-TaggingLDA, which is based on the Latent Dirichlet Allocation probabilistic topic model. We performed a user evaluation with 115 participants to measure the usability and effectiveness of α-TaggingLDA in a collaborative learning environment.	We present an augmented reality based table- top system with interface elements made of paper that addresses these issues. It integrates conventional geometry tools seamlessly into the ac- tivity and it enables group and classroom-level learning. In order to eval- uate our system, we conducted an exploratory user study based on three learning activities: classifying quadrilaterals, discovering the protractor and describing angles. We observed how paper interfaces can be easily adopted into the traditional classroom practices.
Results	The results show that automatically generated tags were preferred 35% more than the original authors' annotations. Further, they were 17.7% more relevant in terms of recall for users.	
Implication	The implication of these results is that automatic tagging can facilitate effective information access to relevant learning objects.	

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Introduction

Purpose

- guide the reader from a general subject area to a particular field of research
- provide all information necessary to understand the rest of the paper

Introduction

Phases of an Introduction (adapted from Swales, 1993 and Derntl, 2014)

- Establish a Territory
- Establish a Niche
- Occupy the Niche

Introduction

Establish a Territory

- bring out the importance of the subject
- make general statements about the subject
- summarize current research on the subject

Introduction

Establish a Niche

- state how your work differs from existing work
- oppose an existing assumption or reveal a research gap
- explain what other findings, if any, you are challenging or extending
- formulate a research question or problem that is investigated

Introduction

Occupy the Niche

- sketch the intent of the own work
- outline important characteristics of the own work
- briefly describe the experiment, hypothesis(es), research question(s), general experimental design or method
- outline important results
- give a brief outlook on the structure of the paper

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Body

- reports on the actual research
- answers two general questions
  - how was the problem addressed (**Materials, Methods**)
    - provide enough details so that others can understand and replicate your research
    - explain your (own) methodology in detail or name the method you used
  - what was found (**Results**)
    - objectively present your findings
    - explain what you found
    - show how your finding contribute to scientific knowledge
- usually consists of several sections
  - structure, organization and content depend on the type of paper

Body

Example: Body of an Empirical Paper (Derntl, 2014)

- describe the material and data used for the study
- illustrate the methodologies applied to answer the research questions
- report the results obtained
- important: provide all information necessary to repeat or reproduce the work

Body

Example: Body of an Case Study Paper (Derntl, 2014)

- describe the application of existing methods, theory or tools
- important: based on your results, provide relevant reflections for others working on related methods, theories or tools

Body

Example: Body of an Methodology Paper (Derntl, 2014)

- describe a novel method intended for use in research or practical settings
- important: paper should be clear about the intended audience

Body

Example: Body of an Theory Paper (Derntl, 2014)

- describe principles, concepts or models
- important: position your ideas in relation to related work

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Discussion

Purpose

- guide the reader from specific results to more general conclusions

Discussion

Parts of the Discussion

- briefly recapitulate your research question and approach
- briefly summarize of the results
- compare results with existing research in the field
- explain how results extend the state-of-the-art in your scientific field
- draw conclusion based on your results
  - but: avoid undue speculation
- provide outlook for future research

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References

What is a Citation?

"When you use another person's work in your own work, either by referring to their ideas, or by including a direct quotation, you must acknowledge this in the text of your work. This acknowledgement is called a citation."

Imperial College London. Citing & Referencing: Harvard Style. Available online: www.imperial.ac.uk/library/

References

Reasons for Referencing

- acknowledge ideas of others that you have used in your own work
  - rule: any idea and/or information that is not your own and not ‘common knowledge’ must be recognized by a citation
- demonstrate that you conducted a careful literature survey and know the state-of-the-art

References

- referencing consists of two parts
  - citations within the text
  - reference list with all cited sources at the end of the work
- with regard to your reference list, make sure to follow two basic rules
  - list every source you cited
  - check that every listed source is cited

Referencing Systems

Most Commonly Used Referencing Systems (cf. Derntl, 2004 and Day, 1983)

- Name and Year System
- Alphabet-Number System
- Citation Order System

Referencing Systems

Name and Year System

- references are cited by authors and year of publication
  - e.g., “Chuck and Norris (2003) define …“
- advantage: adding or removing references does not require to change citations
- disadvantage: multiple, subsequent situation might make sentences hard to read

Referencing Systems

Alphabet-Number System

- references are listed in alphabetical order in the reference list
- cited by using their respective number in (square) brackets
  - e.g., “As reported in [4], …“
- advantage: convenient for readers, as it does not break the flow of reading
- disadvantage: authors need to update numbers when reference list changed

Referencing Systems

Citation Order System

- similar to the alphabet-number system
- major difference: reference list is not sorted alphabetically, but in the order of appearance
- advantages and disadvantages: see above

Style Guides

- different scientific communities use different style guides, e.g.,
  - American Psychological Association (APA) Style
  - Harvard Reference Style
  - Chicago Style
- most widely used styles in computer science
  - Association for Computing Machinery (ACM)
  - IEEE Computer Society
  - Springer (Lecture Notes series)

Style Guides

- citation system to be used depends on different factors including, e.g.,
  - scientific discipline
  - publisher
  - publication outlet
- before you start writing
  - check if a certain style is required
  - if not, choose one and use it consistently

Plagirasm

Definition of “plagiarize“ according to Merriam Webster

- to steal and pass off (the ideas or words of another) as one’s own
- use (another’s production) without crediting the source
- to commit literary theft
- present as new and original an idea or product derived from an existing source

Plagirasm

All of the Following are Considered Plagiarism (copied from www.plagiarism.org)

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not

Summary

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