Research methodology - Scientific papers

Zoltán Horváth

Eötvös Loránd University
Faculty of Informatics
hz@inf.elte.hu

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Scientific texts

Based on: Antoni Martínez Ballesté: Writing Scientific Papers.

From manuscripts (XVII century) to online (open access) publications.

Scientific texts:

- Research paper;
- Report;
- Survey paper;
- Position paper;
- Letter;
- Scientific book;
- Book of proceedings, book of abstracts;
- Ph.D. thesis; master thesis;

Scientific paper

The **IMRaD** structure of a scientific research paper:

- Authors with affiliation, ORCID, email address;
- Title (identifies the new result);
- Abstract (briefly summarise - IMRaD itself);
- Keywords, ACM classification;
- **I**ntroduction (topic, research question, goal, background, related work);
- **M**ethods (new proposal);
- **R**esults and validation (section assessing the method and/or comparing the new proposal with existing ones);
- **D**iscussion (summary of achivements, further work);
- Acknowledgements;
- Bibliography;
- Appendices;

New Methods and Results

Research paper is based on a new method and result or improvement of an exsisting one (beyond the state of the art).

- An algorithm;
- A communication protocol;
- An architecture - including algorithms and communication protocols;
- Theoretical results (theorems, lemmas and corollaries);

Title

Complete, original, unique, relevant on new result.

Examples (from Scientific Writing Modul):

- *Privacy Preserving Techniques* - broad topic;
- *Privacy Preserving Techniques in Statistical Databases* - more focused, but survey or new result?
- *A New Method for Privacy Preservation in Statistical Databases* - research paper, result undefined;
- *A New Method for Privacy Preservation in Statistical Databases Based on Improving Microaggregation* - includes reference to own proposal
- *An MDAV Based Approach for Near-Optimal Microaggregation in Numerical Databases*
- *Location Privacy Through Users' Collaboration: A Distributed Pseudonymizer* - compound, clear: identifies new result and method;

Authors - roles

- New idea proposer;
- Doing experiments, implementing prototype;
- Literature research;
- Writing the text;
- Internal reviewer - in acknowledgements;

Order of authors, corresponding author;

Acknowledgements - supported by;

Abstract

50-300 words summary of the topic and the main achievements - freely accessible.

- In present tense;
- summarises the aim of the work;
- describes the methodology;
- summarises the results;

May be followed by keywords and classification in ACM Computing Classification System: https://dl.acm.org/ccs , https://cran.r-project.org/web/classifications/ACM.html

e.g.: D.1.1: Applicative (Functional) Programming
D.2: SOFTWARE ENGINEERING
Keywords: static analysis, refactoring

Introduction

- Introduce the topic (depending of the audience);
- Problem to be solved and main goals;
- Background concepts;
- Previous Work/Related Work/State of the Art
- Classification of the previous work;
- References: bibliographic citation with main features and shortcomings;

Cited by - towards survey of the state of the art

Google Scholar

Presentation of new results

- algorithm: textual, pseudocode, flow-chart, structogram;
- protocol: content and flow of messages, sequence diagrams;
- architecture: figure with components and interactions;
- theoretical results: definitions, lemmas, theorems, proofs, formulae in a structured order;