



UNIVERSITY OF TARTU
Institute of Computer Science

How to write reports, scientific papers, thesis?

Mobile and Cloud
Computing Seminar (2022/23 spring)

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20 MARCH 2023

Outline

- **Elements of an academic paper**
- **Checklist**
- **Ph.D.**
- **PostDoc**

Main focus in this session

Academic writing

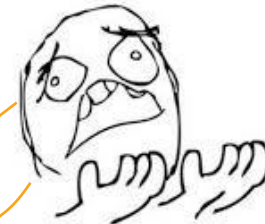
- written by professionals
- Specific to a field
- edited/reviewed by the authors' peers
- often take years to publish.
- language is formal
- list of references

Main focus in this session

Academic writing

- written by professionals
- Specific to a field
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BUT WHY???



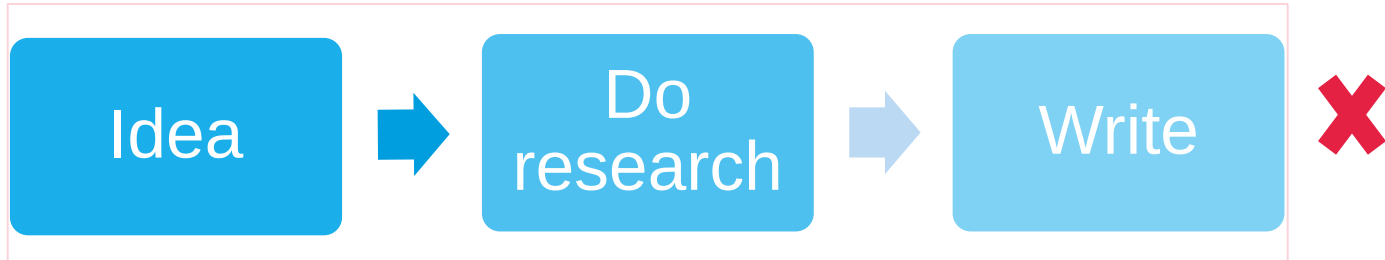
- Lot of time & effort
- Also a lot of bad papers out there

How to write reports, scientific papers, thesis?

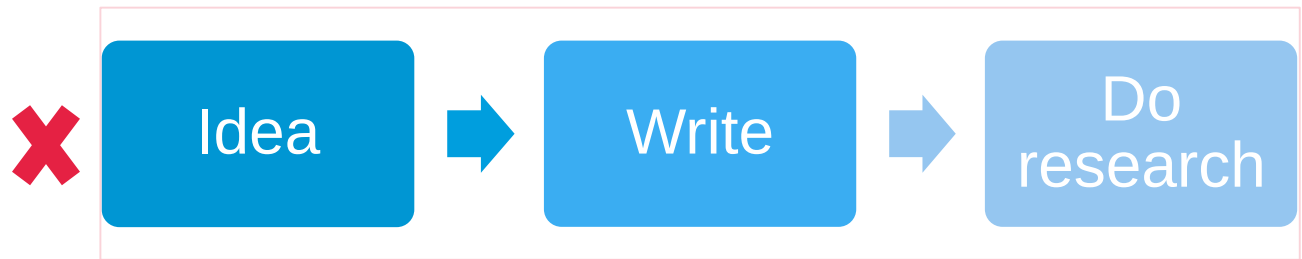
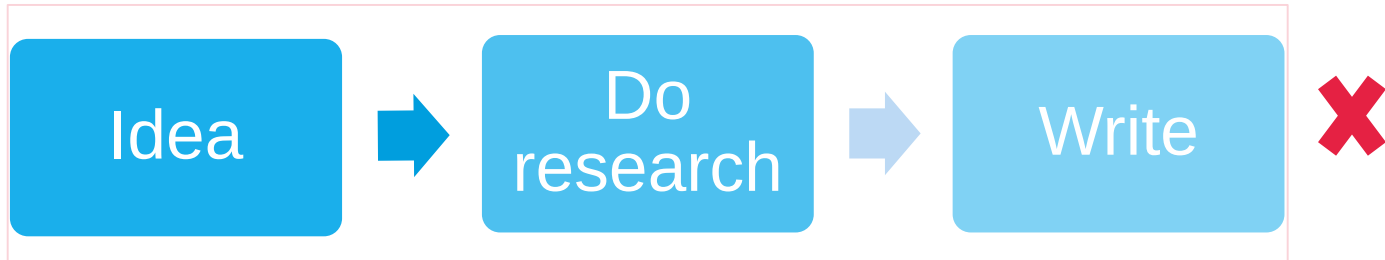
Why Write?

- Part of doing research well
- Better impact
- Larger audience
- Share
- Better ideas

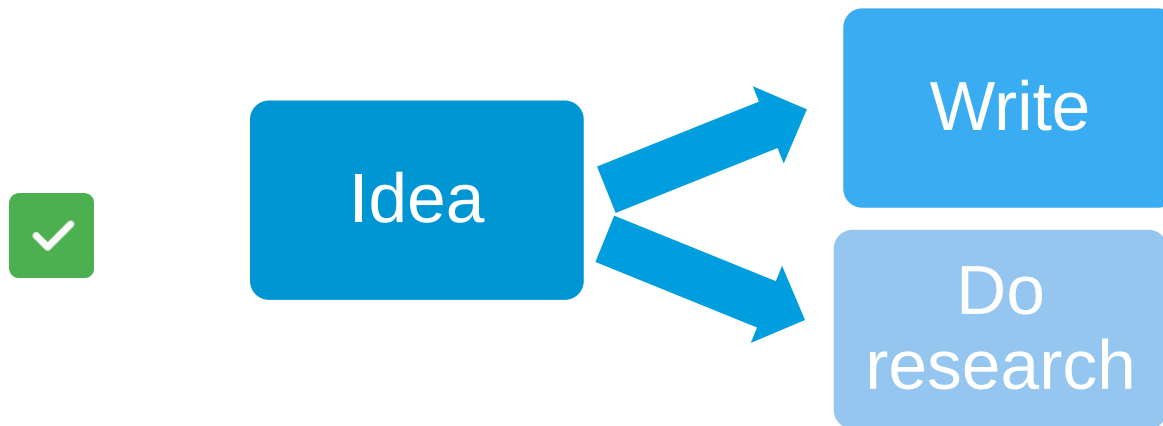
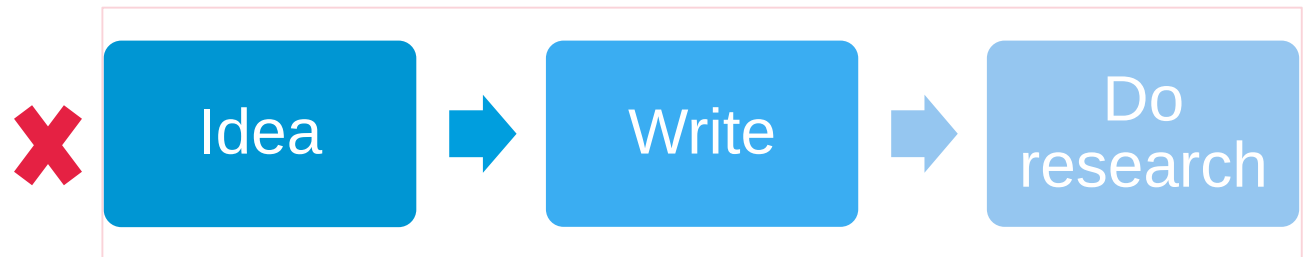
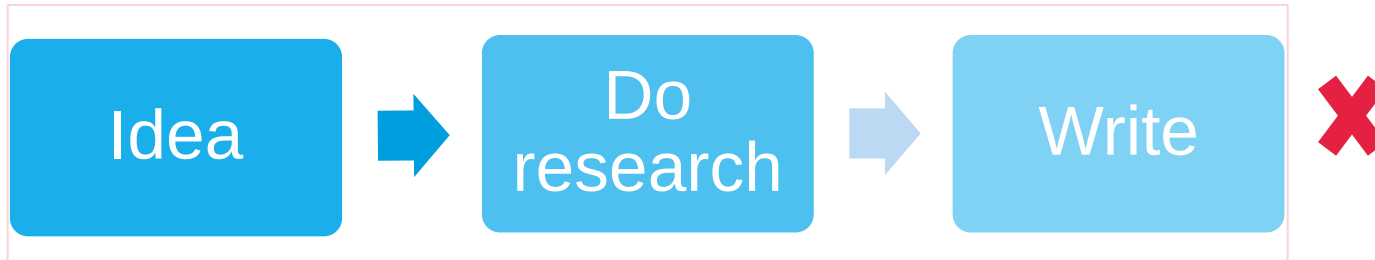
When to Write?



When to Write?



When to Write?



Know your topic first

Elements of an Academic Article

- Title Page
- Abstract
- Introduction
- Literature survey
- Problem statement
- Proposed solution
- Performance Evaluation
- Conclusion and future works
- References

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This may be different:

- Survey paper
- Magazines
- Short paper

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Guide for Authors

e.g.

<https://www.elsevier.com/journals/journal-of-parallel-and-distributed-computing/0743-7315/guide-for-authors>

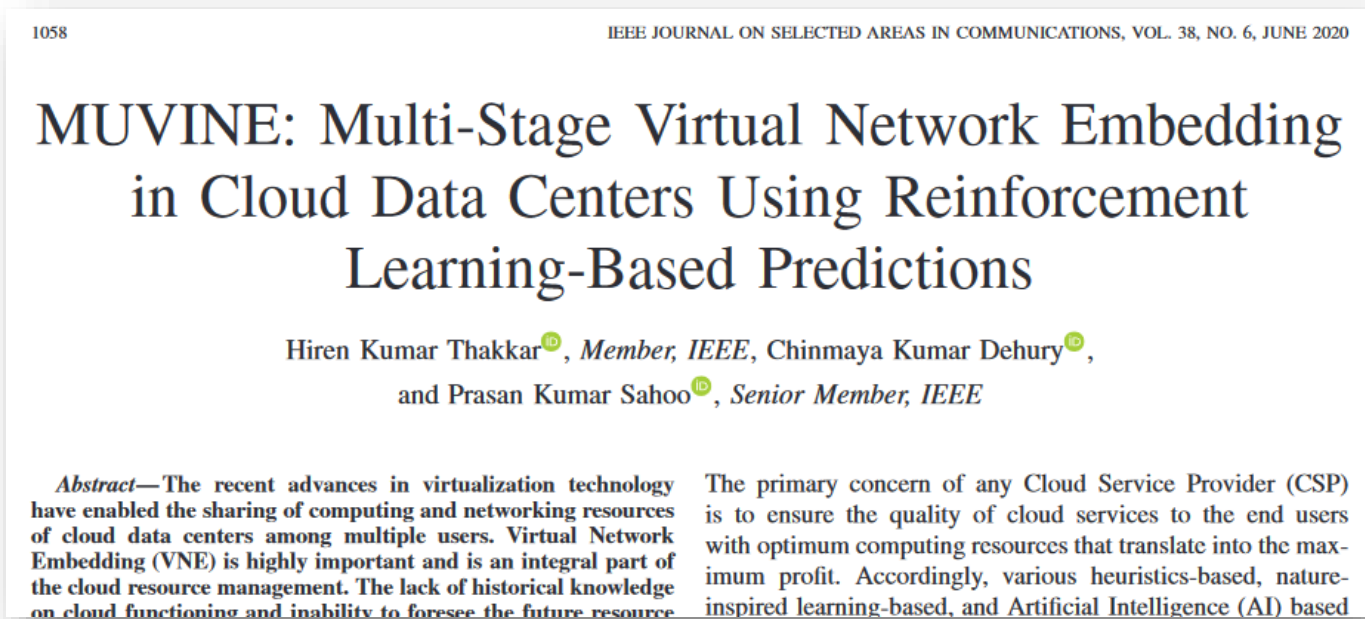
Elements of an Academic Article

- Title Page
 - Abstract
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- Title:
 - Usually 4-12 words in length.
 - Should be short, specific and descriptive, containing the keywords of the report.
 - Authorship
 - Sometime very confusing when author name has more than two words. Sometime I use Chinmaya Kumar Dehury, sometime Chinmaya Dehury (mostly)
 - Email-ID
 - Affiliation
 - May also contain Membership (IEEE member, IEEE Senior member, etc)
 - Some academic research profile ID (e.g. ORCID ID)
 - Article History
 - DOI
 - *Imp:*
 - *usually you will not find separate title page in most of the computer science related research articles*
 - *This may require while submitting a paper for publication*

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Example



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Example

1058

IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, VOL. 38, NO. 6, JUNE 2020

MUVINE: Multi-Stage Virtual Network Embedding in Cloud Data Centers Using Reinforcement

THE cloud computing is a recent advancement in virtualization technology that can dynamically provision infinite computing resources to the end users on pay as you use basis.

Manuscript received April 15, 2019; revised January 23, 2020; accepted January 28, 2020. Date of publication April 8, 2020; date of current version May 21, 2020. This work was supported in part by the Ministry of Science and Technology (MOST), Taiwan, under Grant 108-2221-E-182-050 and in part by Chang Gung Medical Foundation, Taiwan, under Grant CMRPD 2J0141. (Corresponding author: Prasan Kumar Sahoo.)

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Prasan Kumar Sahoo is with the Department of Computer Science and Information Engineering, Chang Gung University, Taoyuan 33302, Taiwan, and also with the Division of Colon and Rectal Surgery, Chang Gung Memorial Hospital, Taoyuan 33305, Taiwan (e-mail: pksahoo@mail.cgu.edu.tw).

Color versions of one or more of the figures in this article are available online at <http://ieeexplore.ieee.org>.

Digital Object Identifier 10.1109/JSAC.2020.2986663

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See <https://www.ieee.org/publications/rights/index.html> for more information.

the machine learns without the known outcomes. Contrary to the supervised and unsupervised learning, the agent (machine) learns in real-time from the environment to optimize the given problem in reinforcement learning.

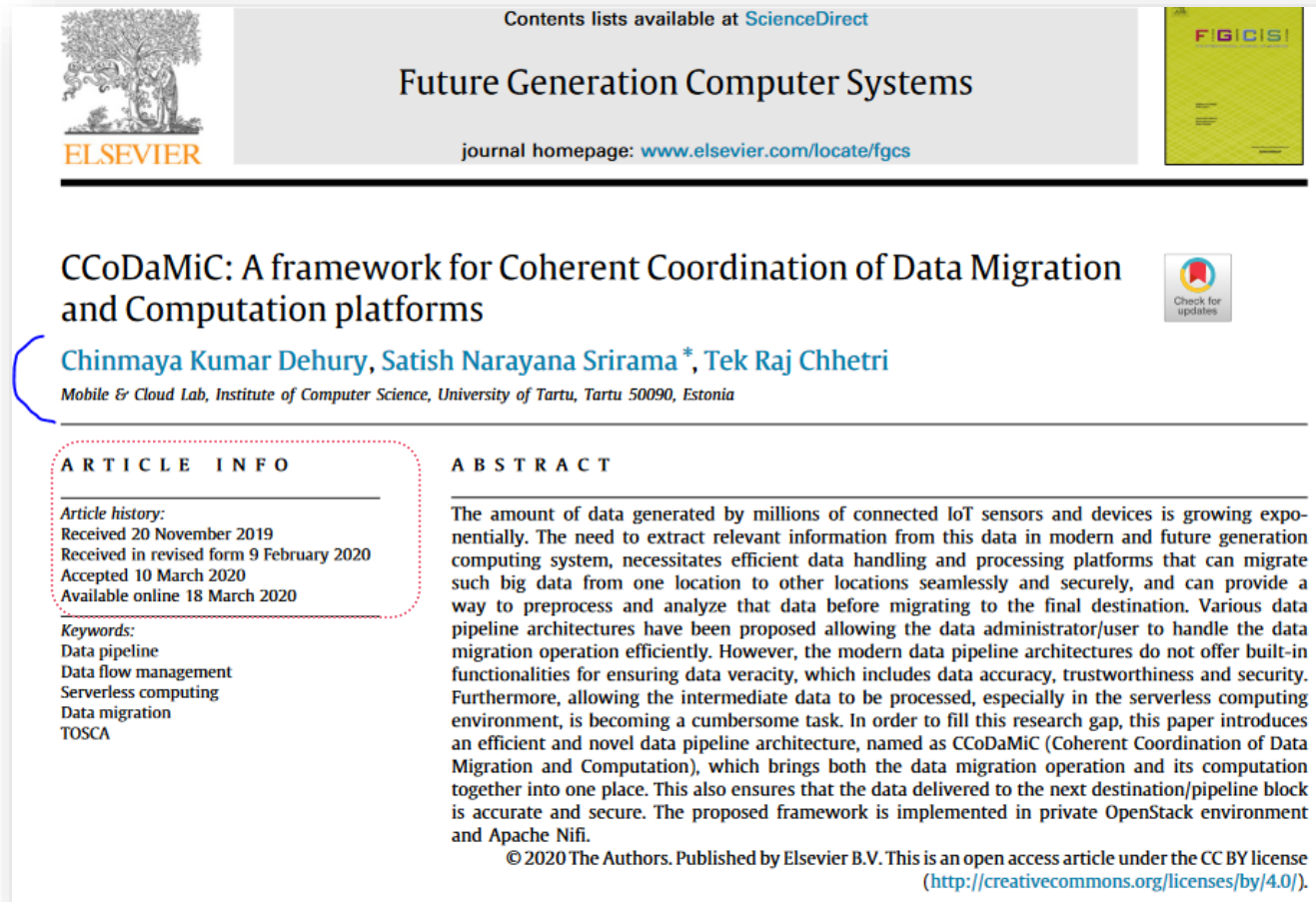
Although AI techniques help to build an efficient prediction model, it poses numerous challenges as well. The foremost challenge is to choose the right AI technique for a given application, dataset type, size, and nature of the problem. However, considering the robustness, the recent years have witnessed a myriad growth of applications of AI gradually replacing the traditional approaches with improved accuracy. The home automation [1], self-driving car [2], cardiac signal processing [3], automated cloud resource management [4] are considered few of the potential applications that benefit the most by AI. Among the aforementioned applications, automated cloud resource management is considered as the challenging one due to the underlying complexity.

On the other hand, cloud computing environment provides the computing and storage resources to the users, which encourages the users to execute the complex applications and stores the raw data without concerning much about the storage space [5]. The computing and storage as virtual resources are

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Elements of an Academic Article

Example



Contents lists available at ScienceDirect

Future Generation Computer Systems

journal homepage: www.elsevier.com/locate/fgcs



it. Handling the data refers to transforming the data from one structure to another, processing the data to retrieve the useful information, and eventually loading the processed or the raw data to the desired location. Based on the situation, these operations

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<https://doi.org/10.1016/j.future.2020.03.029>
0167-739X/© 2020 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

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Available online 18 March 2020

Keywords:
Data pipeline
Data flow management
Serverless computing
Data migration
TOSCA

computing system, necessitates efficient data handling and processing platforms that can migrate such big data from one location to other locations seamlessly and securely, and can provide a way to preprocess and analyze that data before migrating to the final destination. Various data pipeline architectures have been proposed allowing the data administrator/user to handle the data migration operation efficiently. However, the modern data pipeline architectures do not offer built-in functionalities for ensuring data veracity, which includes data accuracy, trustworthiness and security. Furthermore, allowing the intermediate data to be processed, especially in the serverless computing environment, is becoming a cumbersome task. In order to fill this research gap, this paper introduces an efficient and novel data pipeline architecture, named as CCoDaMiC (Coherent Coordination of Data Migration and Computation), which brings both the data migration operation and its computation together into one place. This also ensures that the data delivered to the next destination/pipeline block is accurate and secure. The proposed framework is implemented in private OpenStack environment and Apache Nifi.

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Abstract

- **Summary of the whole paper/article**
 - 1-2 sentences on background
 - 1-2 sentences on problem/motivation
 - What this paper is proposing?
 - Introduce the name of your solution
 - Goal
 - Using what tool?
 - How the proposed system works
 - Simulation/experiment performance
 - Conclusion/implications

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Abstract

- Around ~ 200 words
 - sometimes 100-120 word, or < 150 words
- Depends on the page limit and the publisher
- Conferences usually have less word limit
- Publishing houses use Abstract to recommend journals for the publication
- This is open/public all the time
- The following should not be included in the Abstract:
 - Literature citations.
 - Formulae and abbreviations, references to tables.
 - Never refer to figures or tables in your abstract.
- Although the Abstract comes first in a report, it is sometime suggested to write it last, after you have the results and conclusions. (It varies person to person)

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Introduction

- Introduction of a research paper
- Lets say the topic is
 - “DYVINE: Fitness-Based Dynamic Virtual Network Embedding in Cloud Computing”
 - <https://kodu.ut.ee/~dehury/publications/J4.DIVNE-JSAC-dehury-2019.pdf>
- Understand the **keywords**
- Start from a broad term
- Introduce the keywords
 - E.g. cloud computing --> VNE--> embedding method.....
- towards end of the introduction:
 - Give a hint to the concerned problem
- Avoid unnecessarily **long paragraphs**.

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Introduction

- Motivation
 - Best to give an motivational example
 - If possible give in pictorial form
 - Link with real world application
 - ---- example demo ---:
<https://kodu.ut.ee/~dehury/publications/J4.DIVNE-JSAC-dehury-2019.pdf>
- Contributions and goals
 - Contribution should be in bullet points
 - Should not have multiple goals
 - ---- example demo ---:
<https://kodu.ut.ee/~dehury/publications/J4.DIVNE-JSAC-dehury-2019.pdf>
- Last paragraph: Organization of the paper

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Background

- Sometime different from Introduction
- Your paper may not have a background section
 - So combine with the introduction section
- This mostly focused on the background of the specific technology or concept
 - E.g. for previous title, background should focus around the fault tolerant strategies

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Literature Survey

- aka *Related works*
- to get related papers:
 - Find the keywords
 - Search with keywords in IEEE Explorer, Google scholar, Scimedirect and other search engines
 - Go through the papers and see if you got any new close keywords
- For each paper
 - Get the summary
 - Find the limitations
- Categories the papers (Example)
- Give a comparison table
 - ---- example demo ---: <https://kodu.ut.ee/~dehury/publications/J4.DIVNE-JSAC-dehury-2019.pdf>

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Problem Formulation/Statement

- Explain the problem on the basis of your goal, literature survey
- Model the whole environment
 - Don't forget to give the list of notations
 - Don't forget to give the equation numbers
 - Make sure notations are defined, used and are unique
 - Make sure all acronyms are defined

Elements of an Academic Article

Problem Formulation/Statement

- Title Page
- Abstract
- Introduction
- Literature survey
- **Problem statement**
- Proposed solution
- Performance Evaluation
- Conclusion and future works
- References

- Specify your objective
- Demonstrate your proposed system with and an example
 - ---- example demo ---:

<https://kodu.ut.ee/~dehury/publications/J4.DIVNE-JSAC-dehury-2019.pdf>

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- References

Proposed

- Algorithm/Architecture/Framework/Strategy
- Introduce the name of the proposed solution (this can be in heading)
- Detailed explanation of your paper
 - Algorithms
 - Mathematical proof with theorems, lemmas etc.
 - Don't forget to justify if you are saying "optimal" or "novel"
- Demonstrate your proposed system with and an example
 - ---- example demo ----:
<https://kodu.ut.ee/~dehury/publications/J4.DIVNE-JSAC-dehury-2019.pdf>

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- **Performance Evaluation**
- Conclusion and future works
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Performance evaluation

- Simulation or experiment
- Implementation setup
- Which simulator
- Simulation configuration
- Short description on the related algorithm with which you are comparing your framework/algorithm
- Performance metrics for comparison
 - Definitions
 - How to calculate?

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- **Performance Evaluation**
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Performance evaluation

- Simulation or experiment
- Results
 - Graphs/figures/data
 - Graphs should be very clear
 - You may use Excel or built-in tools or latex tools to draw the graph
 - Should be in eps or in **pdf** format
- Result discussion
 - Why this behavior ?
 - Quantify the improvement

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- **Conclusion and future works**
- References

Conclusions and Future works

- Conclude the paper
- Give a paragraph on the future work
 - No paper is COMPLETE

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- **References**

- **References**

- Make sure all are cited
- No missing references
- Search for ‘?’ in the final pdf
- Make sure all references are consistent format
 - Recommended to use latex bibliography
- Number of references
 - Check with the journal requirement, if any.

Checklist

Checklist before submission

- ☐ Spelling and grammar
- ☐ Vocabulary
 - ☐ Avoid : very weak vocabulary choices
 - ☐ Avoid REPETITION
- ☐ Avoid self-reference such as “... as I explained in the previous Chapter, ...”)
- ☐ No very long sentences
- ☐ Usually I don't use any plagiarism finder
 - ☐ Why?
- ☐ List of acronyms
- ☐ List of mathematical notations
- ☐ Equation numbers

Checklist before submission

- ☐ Table captions, including their position
- ☐ Figure captions, including their position
- ☐ All tables and figures are referred
- ☐ Keywords
- ☐ Page limit of journal/conf.
- ☐ **Guide for Authors**

Please go through UT's recommendation to write your thesis [[src](#)][[pdf: Jump to "Sec 3. The structure and format of theses"](#)]

Ph.D.

Please go through

PhD Introduction Evening 2021 - UT

<https://www.youtube.com/watch?v=DkpRvDcZsgc>

PostDoc

PostDoc

- A temporary working position
- Responsibilities : Not different from a professor
- 1 yr – 3 yrs
 - May go more or less
- How to get?
 - From the paper in your domain
 - Compile a list of professors, research groups
 - Email them
 - Follow them
 - Youtube, Linkedin, Twitter, Facebook, Their official websites etc...
- Work more independently
- Need a supervisor

References

- <https://cra.org/resources/best-practice-memos/computer-science-postdocs-best-practices/>
- <https://www.youtube.com/channel/UCU1dUq5AqqdyTPj6UZjGHLQ/videos>
- <https://slc.berkeley.edu/writing-worksheets-and-other-writing-resources/nine-basic-ways-improve-your-style-academic-writing>
- https://en.wikipedia.org/wiki/Academic_writing
- https://www.wlc.edu/uploadedFiles/Content/Academics/Student_Success_Center/ResearchPaper.pdf
- <https://cs.ut.ee/en/content/thesis-deadlines-and-guidelines>
- https://cs.ut.ee/sites/default/files/2022-01/guidelines_for_graduationtheses_atut_iofcs_2017.pdf
- <https://doi.org/10.1145/2792434.2792439>



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Q&A



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