Writing Skills

Writing a Scientific Paper (Section by Section):

- **Title:**
    - Specific and representative (reflect the contribution)
    - Avoid overclaiming
    - Not too long
    - Include important keywords (hot topics) from your domain (you can use related searches in Google Scholar to identify some).
    - Attractive
    - Avoid repeating existing titles
    - Give a catchy name for your solution (avoid meaningless names, ex: BRTH).

- **Keywords:** Include important keywords (hot topics) from your domain (you can use related searches in Google Scholar to identify some).

- **Abstract:**

    - Present an overview of the results

    - Short to the point: max 200 words

    - Avoid overclaiming

- Shouldn't be too technical (no mathematical definitions, no equations) and use clear words.

- No figures and no citations

- Structure:

• 1 sentence of background (talk about the domain in general)

• 1-2 sentences about the problem (A substantial gap in the literature in that domain is)

• 1-2 sentences to describe your contribution (how are you solving the problem)

• 1 sentence to summarize the results (Our solution outperforms 2 state-of-the-art approaches in term of accuracy).

- **Introduction:**
  o Clearly state the importance of your research
  o Give a summary about the domain
  o Define the specific problem
  o Explain the methodology
  o State the contributions clearly (using bullets)
  o Highlight the need of your solution
  o Overview of the literature review
  o Describe the organization of the paper
  o 1 page max usually

- Structure:
  - **1.1 Background:** talk in more detail about your domain
  - **1.2 Problem Statement:** Overview of the literature and the gaps:
    - Machine-learning based solutions ref(1, 2, etc) for IoT propose to. However, the main limitation of these approaches is. Optimization-based approaches Ref(1,2…)
  - **1.3 Contributions:** To solve the aforementioned gaps, we propose.
    - **Optional:** Parts of your solution are inspired by ()
    - **Bullets:**
      - 1- The most important contribution. To the best of our knowledge, this is the first approach that….
      - 2- Sub-contribution
      - 3- Sub-contribution

Include 2 sentences about the experiments: We compared outperforms 2 state-of-the-art approaches in term of accuracy by 2%.

1.4 Paper Organization: Describe the structure for the rest of the paper: In Section 2, we review the literature and highlight the unique contributions of our work. In Section 3, we describe the details of our solution. In Section4, .

Related Work:

- Classification of the literature:
    - 2.1
        - Limitations of that class
    - 2.2
        - Limitations of that class
- Highlight the unique contributions of your work in comparison with all classes.
- Recent papers: 2-3 years old unless it is a substantial paper in the domain.
- **Optional:** Use a table to summarize the papers you talked about.

Proposed Solution:

- Methodology technically
- Depending on the domain, you can describe the data (in most domains, it is described in the experiments section)
- Architecture and diagrams
- Include equations and algorithms
- Preliminaries (give technical background about relevant previous work).
- Describe the notations (use tables)
- Structure:
    - Solution overview : Include architectural design (figure) and describe it.
    - Preliminaries
    - Problem Formulation: formal or mathematical description of the solution – Ex: describing the optimization problem that you are trying to solve.

       o Solution: include algorithms and describe them.

Experiments:

- Comparisons with existing approaches or justify why you didn`t compare.
- Performance analysis of the proposed solution
- Experimental setup:
  - o Describe the evaluation metrics (accuracy, complexity, CPU usage).
  - o Dataset
  - o Describe the comparison approaches
  - o Parameters (use a table) in the case of simulations
  - o Include details that enable the reproducibility of your solution (code)
- Experiments:
  - o Present the comparisons with literature based on the chosen metrics
  - o Present figures and tables
  - o Justify the results
- Ethical aspects
- Visuals (tables and figures with preference to figures)

Optional: Threats to Validity:

- Describes how the choice of parameters affected the results (how the change in the parameters would change the output of the results)
- Discuss how the choice of the parameters avoids biases

- How resilient your solution is to the changes in the parameters and to randomness.

Conclusion:

- Re-state the main contribution in 2 sentences
- Give a summary of the results with numbers
- Limitations of the work and future directions

Acknowledgement:

- Acknowledge research funding
- Acknowledge any contribution to the idea of the paper

References

Writing a thesis and thesis proposal:

- Title
- Abstract:
    o 1 page
    o Linking all the contributions together: storytelling
    o Background
    o Motivation
    o Problem statement
    o Contributions
    o Overview of results

- **Chapter 1 - Introduction:**
    o Background
    o Motivation of the need of investigating the problem
    o Assumptions:
        ▪ In our research, we consider a city model
    o Research Questions (translate the problems into questions)
    o Research Objective and Contributions:
        ▪ Goal: broad objective that spans over many objectives
        ▪ Objectives: more specific than a goal
        ▪ Each contribution should be an answer to a research question
    o Figure to link the research questions, objectives and contributions.

- **Chapter 2 – Background:**

Describe the main topics and subtopics addressed in the thesis

- **Chapter 3 – Literature Review**
    - Classification (many levels : first based on the topic then based on the approach or the challenge)
    - Conclusive remarks at the end of each class: to state the limitations of each class of approaches

- **Chapters - Contribution Chapters (Number varies):**
    - Introduction: re-state it for a thesis
    - Content from papers

- **Chapter – Conclusion**
    - Re-state the contributions of the thesis
    - Explain how you achieved each single objective¸
    - Discuss about limitations of your work
    - Discuss future directions
    - Timeline (very important in proposals):
        - Semester 1: 2 courses + Investigating Literature Review
        - Semester 2: Literature Review + Defined Problem (RQ1)
        - Semester 3: 1 course + Examen synthese + Started investigating Contribution 1
        - Semester 4: Planning to investigate RQ2 + Literature Review on a subtopic