COMP9517: Computer Vision

2020 T3 Lab 5 Specification

This lab is for practice only, and **will not be assessed**.

Objective: This lab is to reflect on concepts covered in all lectures of Weeks 1-8 and aims to prepare you for the final exam, which will be in similar style. The goal of this lab is to write a commentary on a scientific paper from the field of computer vision and applications.

Materials: The scientific paper to be commented on is: Dewan et al., Tracking biological cells in time-lapse microscopy: an adaptive technique combining motion and topological features, IEEE Transactions on Biomedical Engineering, vol. 58, no. 6, pp. 1637-1647, June 2011. The paper is available online via the UNSW Library.

You are required to use the provided template in writing your report. You are free to consult all the lecture materials as well as other scientific papers available online or via the UNSW library.

Introduction

In all fields of science and engineering, research findings are typically published in the form of peer-reviewed papers in journals and conference proceedings. Every year, millions of papers are published across all fields, in tens of thousands of journals and conferences. In computer vision alone, including areas such as image processing, image analysis, visual pattern recognition, and applications such as medical imaging, there are dozens of journals and conferences (see for example the lists at ImageScience.Org).

As you may guess, not all papers published each year make significant contributions to the knowledge or technological progress. In fact, very few papers report actual breakthroughs and cause paradigm shifts, while the vast majority are merely fine-tuning knowledge and technology within existing paradigms. This phenomenon is well known and was brilliantly described about 60 years ago by the science philosopher Thomas S. Kuhn in *The Structure of Scientific Revolutions*, which became one of the most cited academic books of all time (see the Internet Archive for an online version).

Revolutions in science and engineering are made by people who recognize problems within existing paradigms and dare to think outside the box in finding new solutions, often despite initial fierce resistance from peers in the field. To be able to think outside the box, it is important to have comprehensive knowledge of the current "box", i.e. the existing body of theories, concepts, methods, and tools. In this course we have taught you the basics of computer vision, from image formation to image processing, feature representation, segmentation, pattern recognition, motion tracking, and deep learning, and you have gained practical experience with several of these topics. With this background, you should be able to understand scientific papers and comment on them.

Writing a Commentary

The goal of this last lab is to write a brief commentary on a given paper from the scientific literature in computer vision. Generally, writing a commentary means providing a critical analysis of the aims, methods, experiments, and conclusions presented in a paper, as well as giving alternative viewpoints and recommendations. A commentary does not include new data and depends on the writer's higher-level thinking based on their expertise. Thus, **in the context of this course, it is a good way to test what you have learned.**

To prepare for this assignment, you will first need to carefully read the paper in detail and gather the points you would like to cover in your commentary. Some of the terminology may not be immediately clear to you, and you may need to read some of the references in the paper or other works to get a sufficient understanding. Use an analytical mindset when reading and keep notes to develop your points of critique and suggestions.

A template is provided which gives the required format for writing your commentary. Below are some suggestions of what should be covered in the different sections.

Introduction: Summarise the problem addressed in the paper. Describe what the authors aim to solve and why that is important. Also describe who will benefit if the problem can indeed be solved and what difference it will make to the current practice in the field.

Methods: Summarise the methods used in the paper and comment on them. Describe what kind of computer vision methods were chosen and why. Also describe, based on what you have learned in the course, whether you think the authors made the right choices or whether other methods could have done a better job, and what are the strengths and weaknesses of the methods used or possible alternative methods.

Results: Summarise the experimental results presented in the paper and comment on them. Describe the used evaluation strategy and the main findings. Also comment on whether you think these findings will convince potential users to adopt the proposed method, or what other experiments could have been conducted to make a more convincing case.

Conclusions: Summarise your assessment of the paper. Describe what you believe are the strengths (what was done well) and weaknesses (what could have been done better) based on what you have learned in the course. Also discuss what are the remaining issues that still need to be addressed before the problem stated in the introduction can be considered solved, and give your recommendations for future research.

References: List the literature references you have used in writing your commentary. This section is not mandatory, but if you have used other works to better understand the problem and come up with possible alternative solutions, and especially if you rely on them in making any claims in your commentary, you should list those works.

Guidelines

To give you a better understanding of what is expected, we provide some general guidelines and notes:

- Make sure your writing is **easy to read and understand**. Write in clear English, avoid long and complex sentences, and clarify any terminology not used in the paper or in the course. At the very least, run a spelling and grammar checker. Given today's technology there is no

excuse for obvious writing errors.

- **Use the provided template and nothing else**. Specifically, do not change the given section headings, page or column margins, font type (Times New Roman), font size (10 points for the main text), etc.
- **Respect the limits indicated in the template** regarding the length of the different sections and the complete commentary. The sections are not required to be all the same length. Some sections may be longer than others, provided each section is at least half a column, and the entire commentary (excluding the references) is no longer than 2 pages. In the final exam, anything over the limit will not be assessed. Notice that while the indicated limits in principle allow you to submit a commentary of just 1 page, it is unlikely that you can cover all important points in such little space. Use the available space well.
- Given the mentioned space limits, **the use of subsections is discouraged**. Subsection headings can take up quite some space that could probably be used more effectively. Rather, organize each section as a series of coherent paragraphs.
- **Each paragraph should include a topic sentence stating its main point**. It is advisable to put the topic sentence at the beginning of the paragraph so that it is immediately clear what will be discussed in that paragraph. The remainder of the paragraph should then elaborate on the main point using facts, arguments, analyses, examples, or other information, and conclude by connecting back to the main point.
- Write an original commentary. Do not copy-paste material from the paper or any other source. **Your submission for the final exam will be checked for plagiarism** from published and online material as well as among students. Please be reminded of the Plagiarism Policy and principles of Academic Integrity stated in the COMP9517 Course Outline on WebCMS3.
- You may include original illustrations (produced by you) to support your comments but this is not a requirement. Also, whether you include illustrations or not, the page limit remains the same. So carefully consider whether it is worth the effort.
- The four sections (not including the references section) are equally important and worth 2 marks each, adding up to 8 marks. The remaining 2 marks of the total 10 marks for this assignment are for overall quality of the presentation.

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