

Technical Writing and Oral Presentations

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This document provides advice on technical writing, and on giving oral presentations. Good communication skills are essential for success in your career. Every time you write or present, you have the opportunity to work on improving these skills. The advice I give below is applicable to any presentation: a short one like you write in this class, or a long one like your thesis.

In this class, your assignment is to prepare a written and oral summary of a technical paper. I give you strict page and time limits, so that you can focus on organizing and polishing your presentation. Your written summary has to fit on one page. Please use a readable layout, with good-sized margins and fairly large font. I am not happy if you hand in a three page summary that you have crammed onto one page by using a 6 point font! Hand in **a copy of the paper**, as well as your summary. I will return both to you. For the oral presentation, you have 15 or 20 minutes, depending on how many students are in the class. This time limit will be strictly enforced, and includes time you spend on setting up (including delays starting up Powerpoint). Rehearse your talk, to make sure it fits into the time limit.

How to choose a paper

You are free to choose a paper from any journal or conference, provided the paper is somehow related to pattern recognition.

If you don't know where to start, I recommend looking at recent issues of *PAMI* (that's the *IEEE Transactions on Pattern Analysis and Machine Intelligence*). Alternatively, you can look at the *International Journal of Pattern Recognition and Artificial Intelligence*, or the journal *Pattern Recognition*. These journals publish papers on a variety of topics -- you should be able to find one on a topic that interests you. You don't have to shy away from an interesting paper because it contains too much math. All we require is an overview. You can choose the paper as long as you are able to understand the notation, the statements of theorems, and the conclusions that are drawn. That is enough to allow you to summarize the paper for us effectively; it's ok if you don't understand all the details of proofs and derivations.

Start with a Specification

Technical writing is a complex skill, one that can be developed and improved over many years. Computer programming is the same: there is a long way from "first learning how to program" to being a good software designer.

In computer programming, it is good practice to start with a *specification*, a clear description of what the program is supposed to do. The same is true with technical writing and oral presentations. Write down a specification for your presentation.

- Describe the audience. Describe who the intended audience is (e.g. "graduate students in the School of Computing", or "readers of journal X"). Describe the expected background of the audience. The easiest situation for a presenter is when everyone has the same background. In more complex cases, the audience is mixed: some audience members know this, others know that, some are interested in this, some are more interested in that. Make a list of the concepts that you assume the audience is already familiar with, and a list of the concepts you have to introduce/explain in your writing.
- Describe the main points to convey in the paper/presentation. The following general questions should always be answered in any technical presentation. What area of research are you discussing? (What is the general topic of your talk?) Why should anyone care about this area of research? Provide motivation.

Once you have written the specification, you can plan your presentation (oral or written). What extra topics do you have to include, in order to be able to present the main points, given the audience background? Find a good order for presenting the topics. This is often difficult because topics are circular: it would be good to for the audience to know about B when I explain A, but the opposite is also true: knowledge of A would help when I explain B.

When you are done, review your presentation, compare it to the specification. For a written report, make sure that your first paragraph touches on all the main topics, that the rest of the paper elaborates on those, and that the

whole thing is readable for your “model audience”. Similarly, for an oral presentation, make sure that in your first few minutes you introduce the main topics, and that you then elaborate on these, in a way that is understandable for your model audience.

For the one-page paper summary

Pay particular attention to your first sentence: it should be informative and interesting.

Critique the paper, don’t just summarize it. What are the strong and weak points of this paper? Why did you find the paper interesting? (If you didn’t find anything in the paper interesting, then choose another paper!) To evaluate a paper, consider whether the work appears theoretically sound, whether it appears practical, whether it has been tested sufficiently, how it compares to competing approaches, whether you can devise improved or alternate approaches. Even if you feel underqualified to judge the research content of a paper, you should be able to form some opinions, and justify those opinions.

Focus on writing a great first paragraph, and a great first sentence for all the other paragraphs. Many readers will read only that much. Or, they may read that much and then decide whether they like it enough to read more. It is essential to make your paper *skimmable* so that a hasty reader gets the main points. These comments also apply to the writing of the abstract and introduction for a thesis or conference paper. Such overview sections are often the weakest part of a document, because authors write them last, when they are in a hurry. However, the abstract, introduction, figures, and conclusion are the most important part of a document: they are critical to the perception the reader will have of your work. Abstracts are commonly used as stand-alone pieces of text to represent your thesis or technical paper. Write them carefully. Writing a good abstract takes a lot of time. Show drafts of your abstract to a lot of different people, to get feedback. The abstract should be comprehensible to a non-expert, and should make a good impression on an expert in the area.

Use the first sentence of each paragraph to state the topic for that paragraph. Do not use section headings in a one-page document. In a document that is so short, section headings just cause distracting breaks in the flow of the text.

Motivate the problem, briefly convey what this paper is about, what problems it addresses, how it fits into the larger context of pattern-recognition research. Specifics depend on the paper and your reaction to it. Suppose you find the paper excellent and informative. Then you want to convey (an overview of) what you learned from it, why you found it interesting and worthwhile. Your goal in this case would be to transmit enthusiasm: after reading your summary I would know roughly what the paper is about, and why it’s important, and I would be motivated to read the full paper for further details. Suppose, on the other hand, that you find the paper rather disappointing. Then your summary should convey what the general research area and general approach are, and discuss the shortcomings. This is valuable information for the reader. Depending on the paper, you might convey that “this is a promising research area, but this particular paper is poor, and (if you happen to know) a better alternative is paper X”. Or you might write that “not only is this particular paper flawed, but the whole research area is fundamentally flawed because Y”. Such “negative results” can be very useful, and may well suggest fruitful areas for future research.

You do not have room to discuss details of the paper. Instead, provide context, critique, analysis, and overview. If you do a good job in convincing the reader of the importance of the material, then the full details are available in the original paper. Think of yourself as an author for an Abstracts journal, which is devoted to publishing critical summaries of papers. You can refer to the journal *Computing Reviews* for examples; visit www.reviews.com. Readers use a journal like this to scan the entries, quickly becoming up to date (in a general sense) on a large variety of topics, and with the ability to find detailed information on selected topics. There are many styles of writing reviews -- read a few reviews and decide what style suits you best. Make sure that you don't attempt to include too many technical details in your review. Your job is to convey what is in the paper, without going into a lot of technical detail.

If you find the one-page limit confining, start by writing only half a page, or only three sentences. This forces you to state the most important ideas concisely. Then expand to the luxury of a whole page. The ability to write convincing summaries (for grant proposals, paper abstracts, theses, etc.) is essential in academic work. Writing a good summary is hard; the shorter the summary is, the more difficult it becomes.

For the oral presentation

Be enthusiastic: choose a paper that you find interesting, and project this interest and enthusiasm to the audience. You don't have to force yourself to show noisy cheerleader type enthusiasm; quiet enthusiasm will do.

Identify two to four main ideas that you want to get across in the talk. These are the points the audience should remember even after details have been forgotten.