How to Write an Abstract

Philip Koopman, Carnegie Mellon University
October, 1997

Abstract

Because on-line search databases typically contain only abstracts, it is vital to write a complete but concise description of your work to entice potential readers into obtaining a copy of the full paper. This article describes how to write a good computer architecture abstract for both conference and journal papers. Writers should follow a checklist consisting of: motivation, problem statement, approach, results, and conclusions. Following this checklist should increase the chance of people taking the time to obtain and read your complete paper.

Introduction

Now that the use of on-line publication databases is prevalent, writing a really good abstract has become even more important than it was a decade ago. Abstracts have always served the function of "selling" your work. But now, instead of merely convincing the reader to keep reading the rest of the attached paper, an abstract must convince the reader to leave the comfort of an office and go hunt down a copy of the article from a library (or worse, obtain one after a long wait through inter-library loan). In a business context, an "executive summary" is often the only piece of a report read by the people who matter; and it should be similar in content if not tone to a journal paper abstract.

Checklist: Parts of an Abstract

Despite the fact that an abstract is quite brief, it must do almost as much work as the multi-page paper that follows it. In a computer architecture paper, this means that it should in most cases include the following sections. Each section is typically a single sentence, although there is room for creativity. In particular, the parts may be merged or spread among a set of sentences. Use the following as a checklist for your next abstract:

- **Motivation:** Why do we care about the problem and the results? If the problem isn't obviously "interesting" it might be better to put motivation first; but if your work is incremental progress on a problem that is widely recognized as important, then it is probably better to put the problem statement first to indicate which piece of the larger problem you are breaking off to work on. This section should include the importance of your work, the difficulty of the area, and the impact it might have if successful.

- **Problem statement:** What problem are you trying to solve? What is the scope of your work (a generalized approach, or for a specific situation)? Be careful not to use too much jargon. In some cases it is appropriate to put the problem statement before the motivation, but usually this only works if most readers already understand why the problem is important.

- **Approach:** How did you go about solving or making progress on the problem? Did you use simulation, analytic models, prototype construction, or analysis of field data for an actual product? What was the extent of your work (did you look at one application program or a hundred programs in twenty different programming languages?) What important variables did you control, ignore, or measure?

- **Results:**
What's the answer? Specifically, most good computer architecture papers conclude that something is so many percent faster, cheaper, smaller, or otherwise better than something else. Put the result there, in numbers. Avoid vague, hand-waving results such as "very", "small", or "significant." If you must be vague, you are only given license to do so when you can talk about orders-of-magnitude improvement. There is a tension here in that you should not provide numbers that can be easily misinterpreted, but on the other hand you don't have room for all the caveats.

- **Conclusions:**
  What are the implications of your answer? Is it going to change the world (unlikely), be a significant "win", be a nice hack, or simply serve as a road sign indicating that this path is a waste of time (all of the previous results are useful). Are your results general, potentially generalizable, or specific to a particular case?

**Other Considerations**

An abstract must be a fully self-contained, capsule description of the paper. It can't assume (or attempt to provoke) the reader into flipping through looking for an explanation of what is meant by some vague statement. It must make sense all by itself. Some points to consider include:

- Meet the word count limitation. If your abstract runs too long, either it will be rejected or someone will take a chainsaw to it to get it down to size. Your purposes will be better served by doing the difficult task of cutting yourself, rather than leaving it to someone else who might be more interested in meeting size restrictions than in representing your efforts in the best possible manner. An abstract word limit of 150 to 200 words is common.
- Any major restrictions or limitations on the results should be stated, if only by using "weasel-words" such as "might", "could", "may", and "seem".
- Think of a half-dozen search phrases and keywords that people looking for your work might use. Be sure that those exact phrases appear in your abstract, so that they will turn up at the top of a search result listing.
- Usually the context of a paper is set by the publication it appears in (for example, *IEEE Computer* magazine's articles are generally about computer technology). But, if your paper appears in a somewhat un-traditional venue, be sure to include in the problem statement the domain or topic area that it is really applicable to.
- Some publications request "keywords". These have two purposes. They are used to facilitate keyword index searches, which are greatly reduced in importance now that on-line abstract text searching is commonly used. However, they are also used to assign papers to review committees or editors, which can be extremely important to your fate. So make sure that the keywords you pick make assigning your paper to a review category obvious (for example, if there is a list of conference topics, use your chosen topic area as one of the keyword tuples).

**Conclusion**

Writing an efficient abstract is hard work, but will repay you with increased impact on the world by enticing people to read your publications. Make sure that all the components of a good abstract are included in the next one you write.

**Further Reading**


Title: Comparative Scores of Hearing-Impaired and Normally Hearing Children Given the Carolina Picture Vocabulary Test.

It is important that educators use adequate assessment procedures when placing hearing-impaired children in mainstreamed settings. Receptive vocabulary tests are part of the standardized test battery and can provide educators with valuable information. Although there has been a receptive vocabulary test recently developed for use with hearing-impaired children (CPVT), the most commonly used test with this population is the PPVT-R, which is standardized on normally hearing children. In order to further explore the difference between the receptive vocabulary of hearing-impaired and normally hearing children, a test standardized on hearing-impaired children should be used.

The purpose of the present study was to determine if differences exist between the receptive vocabulary scores of hearing-impaired and normally hearing children on the CPVT. This study also sought to answer the following questions: 1) What is the correlation between the CPVT and the PPVT-R?, and 2) Is there a difference between the z-scores and age equivalent scores of the normally hearing children on the CPVT and the PPVT-R?

Fifty 7- and 8-year olds were selected from the Portland Metropolitan area as subjects. Each subject passed a puretone audiometric screening, had a negative history of
ear infections, had not received any speech, language, hearing, or reading services, and received parental permission to be in the study.

Mean z-scores and age equivalent scores on the CPVT and the PPVT-R were computed for the subjects in the study. Two tailed t-tests were computed to determine if a difference exists between the performance of the normally hearing subjects on the CPVT and the normative data for the hearing-impaired. The tests were considered significant at the .05 level. A highly significant difference was found between the z-scores and age equivalent scores of the 7- and 8-year old normally hearing subjects and the normative data for the hearing-impaired. The normally hearing subjects scored higher on the CPVT than the standardized data. These results are consistent with previous research showing that hearing-impaired children perform significantly lower than their normally hearing peers on vocabulary tests.
Title: Dependence of Z Boson Kinematic Variables on the Parton Distribution Functions in the ATLAS Experiment

Author: Anonymous

Specialization: Nuclear Engineering

Sort of project: Diploma thesis

Supervisor: RNDr. Pavel Staroba, CSc., IP, ASCR v.v.i.

Abstract: Main goal of this diploma thesis is to quantify the influence of uncertainty of our knowledge of parton distribution functions on the distribution of kinematic quantities of Z boson created in ATLAS experiment. The decay channel $Z \rightarrow e^+ + e^-$ is investigated.

The theoretical part of this work describes the theory of structure functions from elastic form factors to parton distribution functions and their evolution. Two most common statistical tests ($\chi^2$ test and Kolmogorov-Smirnov test) used for comparison of shape of distributions are described in one chapter.

Five sets of data (diverging only by parton distribution functions used) containing $pp \rightarrow X + Z \rightarrow e^+ e^-$ events were generated by Herwig/Jimmy. Kolmogorov-Smirnov test was chosen as the most suitable for comparisons of shape of prepared distributions.

Keywords: Standard Model, quantum chromodynamics, theory of electroweak interaction, structure functions, parton distribution functions, Z boson, experiment ATLAS.
HOW TO WRITE AN ABSTRACT

An abstract is a „mini-version” of the paper or research article. It should be written with utmost care.

**Purpose** - to provide the reader with a brief preview of the contents of the article
- to give a clear indication of the objective, scope, and results so that the reader may decide whether to read the whole text
- to prepare the reader for reading the full text, to focus their attention on the direction of the argument and so give them an idea of what to expect

**Language and style** - clear and simple
- impersonal and formal
- as brief and concise as possible

**Form** - the passive voice (to downplay the author and emphasize the information)
- inanimate subjects plus an active verb (for the same reason as above)
- gerunds, participles, noun phrases
- no negative sentences

### Structure:
- problem statement
- methods of approach used
- results
- conclusions/recommendations

### Grammar:
- present tense
- past tense
- present perfect, past tense
- present tense, modal auxiliaries

### Vocabulary:

#### Nouns:
article, data, experiment, findings, method, process, results, study, technique, etc.

#### Verbs:
to assume, to be concerned with, to compare, to confirm, to deal with, to demonstrate, to describe, to discuss, to examine, to find, to illustrate, to include, to indicate, to investigate, to present, to propose, to show, to study, to suggest, to treat, etc.

**Rules:**
- it is at the beginning of the article, but should be written at last
- it should not be longer than 250 words
- it should not give information not contained in the article
- ideas should be organized well
- logical connectors should be used to link the ideas
- **key words** should be included in the abstract (for easy reference) unless they are to be listed below

**Notes:**
- do not simply repeat the title of the project in the first sentence of the abstract
- do not address the reader (e.g., “you will see that”)
- be careful to use the correct word order, that is, e.g., “something is discussed”

**Examples of phrases used:**
A technique has been developed for .....  
Its advantages over existing techniques include .....  
This technique may find application in .....  
Important improvements have been made in the manufacture of .....  
Increased ..... and ..... , as well as decreased ..... , make this development worthy of fuller testing.  
Existing markets should benefit from the introduction of .....  
Some evidence has been found that .....  
The great majority of cases studied showed that .....  
The findings suggest that further research into the problem of .....  
Control of ..... remains a problem.  
One possible solution may be to .....  
The experiments conducted for measurements of ..... are described.  
The experimental data are compared against the theoretical prediction from .....  
In addition, experimental data are used to verify the mathematical model.

**For more information see:**
http://leo.stcloudstate.edu/bizwrite/abstracts.html