CSCE 181: Technical Writing

Spring 2010
Prof. Jennifer Welch

References

- TAMU University Writing Center website
- Zobel textbook

My Writing Credentials

- Author or co-author on over 70 published conference and journal papers
- Revise constantly!
- Give detailed feedback to graduate students on their technical writing (theses, dissertations, papers)

The Writing Process

- Pre-writing
  - Collect your information
- Drafting
  - Organize your ideas: decide in what order to present your information
  - Outline can be helpful
- Rewrite / Edit / Revise
  - Repeat! Read your draft out loud, be critical
  - Focus on logical organization of your material
- Proofread
  - Check for style, grammar, punctuation, typos

Paragraphs

- Break up your writing into paragraphs
- Purpose is to help organize information into blocks
  - Helps writer and reader
- Each block (paragraph) should develop "one idea"
- A good paragraph should be unified
  - Clear focus, no off-topic material
- A good paragraph should also be coherent
  - The sentences in the same paragraph should connect to each other

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A Unified Paragraph

- What constitutes a "single idea"?
- Can vary, depending on the level of detail in your writing
  - Ex: List all the key words of a programming language in one paragraph about key words vs. have one paragraph for each key word what it means
- You might or might not have an explicit topic sentence, but you definitely should have a topic in mind for each paragraph

When to Start a New Paragraph

- To introduce a new idea
- To give the reader a chance to regroup
- To emphasize a point
- To break complicated information down into smaller pieces
- To sum up the main idea

How Long Should a Paragraph Be?

- No strict rule
- More important for the paragraph to do a good job at conveying its point
- But generally, avoid one-sentence paragraphs and multi-page paragraphs

How to Make a Coherent Paragraph

- Have each sentence relate to previous information while also containing new information
- Repeat some key phrases:
  - "Midpoint displacement is a popular method to generate terrain artificially. This technique relies on recursion, making the implementation simple and compact."
- Use parallel structure:
  - "First, the input program is broken into tokens. Second, the tokens are arranged in a parse tree. Finally, the parse tree is converted into object code."
- Use transitional words and phrases:
  - First, finally, in contrast, however, as a result,…

Good Style for Technical Writing in CS

Economy / lack of padding

- "Delete superfluous words, simplify sentence structure, and establish a logical flow" [Zobel]

- Sometimes you have strict page, word or character limits: shrinking your paper can help you to come to a realization concerning how much redundant fluff we all tend to add to our papers unnecessarily

Good Style for Technical Writing in CS

Tone
- Goal is to be objective, accurate, straightforward
- One idea per sentence or paragraph
- Simple logical organization
- Short paragraphs
- Short sentences with simple structure
- Short words (but use appropriate terminology)
- Avoid cliches and slang
- Omit unnecessary material
- Be specific

Good Style for Technical Writing in CS

Balance
- Each topic should be discussed at a level of detail appropriate for the topic's importance to your paper
- Topics that are equally important should be discussed at the same level of detail
- Ex: if you spend a paragraph discussing how the for-loop works, then spend a paragraph discussing how the while-loop works
- Ex: If you paper is 10 pages long total, don't spend 5 pages on the introduction

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Good Style for Technical Writing in CS

References and Citations
- A significant focus in [Zobel] is on original research papers:
  ◦ Need to distinguish your contributions from what was previously known
- However, [Zobel] also has information relevant for surveys and critiques:
  ◦ Demonstrate your knowledge of the area, reader can judge reliability of your statements
  ◦ Provide pointers to background reading for interested readers

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Good Style for Technical Writing in CS

References and Citations
- If you include a reference, it should be
  ◦ relevant
  ◦ up-to-date
  ◦ reasonably accessible
  ◦ necessary (don't pad)
- Prefer original paper over secondary source
- Prefer latest version of the paper (journal over conference over tech report)
- Prefer printed documents rather than web pages

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Good Style for Technical Writing in CS

References and Citations
Think about how authoritative a source is:
- What about using a term paper written by a high school student?
- What about Wikipedia?
- What about a newspaper report? Does it make a difference if it is about a current event vs. a report on a scientific discovery?
- What about a blog?
- Issue of peer review with publications

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Good Style for Technical Writing in CS

Put Your Best Foot Forward
- Put a lot of effort into the opening paragraph
- Direct and to the point
  ◦ Bad: "This paper does not describe a general algorithm for transactions."
- Give context
  ◦ "In this paper we describe a new programming language with matrix manipulation operators." vs.
  ◦ "Most numerical computation is dedicated to manipulation of matrices, but matrix operations are difficult to implement efficiently. In this paper we..."

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Good Style for Technical Writing in CS

Add variety
- Vary sentence structure and length, choice of words

Avoid ambiguity
- "The compiler did not accept the program because it contained errors."
- Watch out for pronouns! Make sure it is always clear what "it", "they", etc. refer to.

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Good Style for Technical Writing in CS

Sentence Structure
- Keep it simple – avoid run-on sentences!
- Avoid nested sentences:
  ◦ "In the first stage, the backtracking tokenizer with a two-element retry buffer, errors, including illegal adjacencies as well as unrecognized tokens, are stored on an error stack for collation into a complete report."
  ◦ Make this into two (or more) sentences.
- Avoid double negatives ("It is not unlike...")
- Avoid rhymes and alliteration

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Good Style for Technical Writing in CS

Sentence Structure
- Avoid repetition such as having a series of sentences all beginning with "Therefore".
- Use parallel structures to help the reader see the difference between two concepts:
  - Ex: " In SIMD, multiple data sets are process simultaneously by the same instructions, whereas in MIMD multiple data sets are processed simultaneously by different instructions."

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Good Style for Technical Writing in CS

Choice of Words
- "Use short words in preference to long, but use an exact long word rather than an approximate short one." [Zobel]
- Use specific words rather than abstract, vague, or overly-broad ones:
  - Bad: "The analysis derives information about programs."
- Avoid multiple qualifiers in same sentence ("It might possibly be...")
- Avoid qualifiers such as: very, quite, totally, highly, certainly, somewhat,...

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Good Style for Technical Writing in CS

Choice of Words
- Other issues discussed well in [Zobel]:
  - lists of commonly misused and misspelled words
  - appropriate and inappropriate use of jargon
  - avoiding cliches, idioms, foreign words, abbreviations and acronyms
  - avoiding overuse of words
  - list of redundant or wordy expressions (to be avoided)

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Sample Paragraph #1

Artificial Intelligence (AI) is exactly what the name states. It is the giving of intelligence or reasoning to machines it is synthetic knowledge. Well this is the current definition of AI. There were those before our time that brought legends to life, this was their most advanced technology, their AI. However, there is a branch of computer science that is dedicated to ensuring the prolonged growth of this division of expertise. There is no founder of AI, but it began in the late 1940's after WWII. Artificial intelligence can be seen today in an assortment of approaches to the definition; several of which are still under construction. However, there is a risk that we run with progression of this kind of technology. There is a threat of knowledge that at times can not tame, knowledge is power.

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Sample Paragraph #1

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give a concise def'n

mention some positives

discuss risks more specifically

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Sample Paragraph #2

Machine Learning is a field in which a problem "learns" through various designs how to improve performance and create a better output as its experience grows. For example, in just the past couple decades, machine learning methods have been applied in the area of speech recognition in which a program is able to recognize and understand the naturally unique variations of a person's voice and still perform its intended function, a system has been created in which an autonomous vehicle is able to drive at highway-speeds for several hours on public roads with other vehicles, as well as a computer program this able to play world-class backgammon and play competitively at the highest levels.

Sample Paragraph #2

Machine Learning studies how to design algorithms that can improve their performance over time as they are exposed to more information. ~~is a field in which a problem "learns" through various designs how to improve performance and create a better output as its experience grows~~. ~~For example,~~ in ~~just~~ the past couple of decades, machine learning methods have been applied to ~~in the area of~~ speech recognition, ~~in which a program is able to recognize and understand the naturally unique variations of a person's voice and still perform its intended function, a system has been created in which an~~ autonomous vehicles, and ~~is able to drive at highway speeds for several hours on public roads with other vehicles, as well as a~~ computer ~~program this able to play world-class~~ backgammon ~~and play competitively at the highest levels~~. [now explain each application in separate sentences or even separate paragraphs]

Sample Paragraph #3

The fact is that the ~~not a cl~~ answer to what all this research could provid ~~researc~~ continues as computer scientists attempt to ~~iden~~ ssible with computer science.