Technical Communication

5. STATING PROBLEMS: WRITING INTRODUCTIONS

Introducing a problem

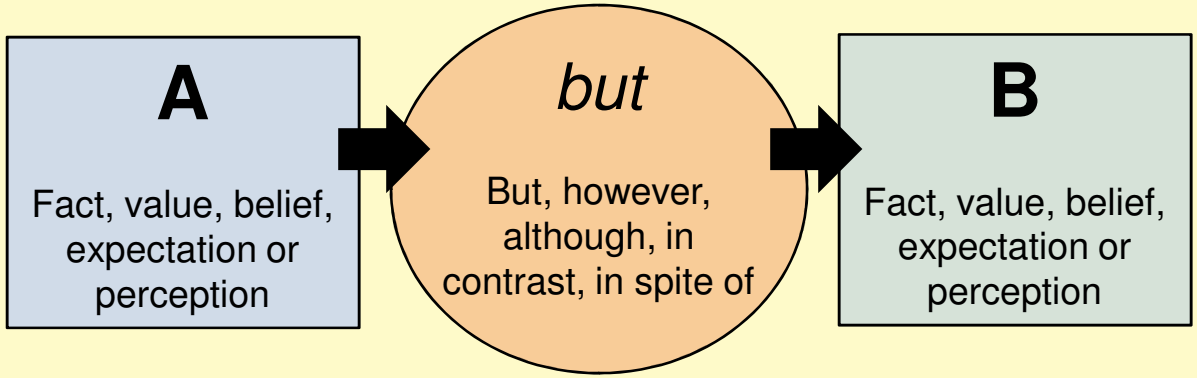
- Knowing how to state a problem is critical to the writing process

- Necessary for
  - Abstracts
  - Introductions
  - Analysis of results
  - Reviews

Psychology of "Problems"

- **Cognitive dissonance** (Festinger, 1957)
  - Stating introductions as conflict is a strong communication
  - The mind wants to eliminate chaos, worry, and psychological discomfort.

- A problem is a conflict between two terms – **A *but* B**.
- Term types
  - Fact
  - Value
  - Belief
  - Expectation
  - Perception



- Ex: "*Belief A*" conflicts with "*perception B*"
  - *Our new stereo system must appeal to that teenage market [belief A]*
  - *However, it apparently does not appeal to this important market [perception B]*

Stating problems – Audience dependent

- State A but B.
- If audience if familiar with A and B, then the conflict is clear.
- But often need to explain A, explain B, and clarify the conflict.

Example - grant proposal:

There are a variety of object extractions algorithms proposed (e.g., [2, 7, 45, 52]) that work reasonably well when a large number of positive and negative images can be provided, and that do not require an object model or reference segmentation. However, for some applications even moderately-sized labeled data sets are not available. For example, you may have a small number of surveillance images containing some unknown object, and you would like to extract the common object from the images. These tasks vary from more traditionally studied applications, both in that the amount of training data is small, and the object to be extracted is a specific object (perhaps at varying angles, and distance from the camera). In medical imaging, it is also important to be able to learn from small sample sizes; for some conditions there may be only a few samples.

Identifying strategy and purpose

- State the problem → show your communication addresses the problem.
  1. Indicate the missing information you're providing
  2. Indicate the strategy you're taking on the problem
  3. Announcing the purpose of the communication

problem → strategy → purpose

- Problem
  - Our new stereo system must appeal to that teenage market. However, it apparently does not appeal to this important market.
- Questions
  - What is wrong with the teenagers?
  - What is wrong with the stereo system?
  - Why aren't the teenager's buying the stereo system?
- Strategy
  - How can we make the stereo more cheap?
  - How can we improve the performance of the stereo?
  - How can we improve advertising?
- Purpose
  - Report, analyze the problem in detail
  - Present a solution

The full introduction

- Version 1:
  - In order to be competitive and profitable, our new stereo system must appeal to the teenage market. However, it apparently does not appeal to this important market, since few teenagers are buying it. What caused this situation. It appears to that a poor sales campaign is the only major cause.
- Version 2:
  - In order to be competitive and profitable, our new stereo system must appeal to the teenage market. However, it apparently does not appeal to this important market, since few teenagers are buying it. This paper investigates the situation and identifies the cause. This report will argue that a poor sales campaign is the only major cause.

Full introductions - Abstracts

Example – conference paper:

Abstract

There has been much work on applying multiple-instance (MI) learning to content-based image retrieval (CBIR) where the goal is to rank all images in a known repository using a small labeled data set. Most existing MI learning algorithms are non-transductive in that the images in the repository serve only as test data and are not used in the learning process. We present MISSL (Multiple-Instance Semi-Supervised Learning) that transforms any MI problem into an input for a graph-based single-instance semi-supervised learning method that encodes the MI aspects of the problem simultaneously working at both the bag and point levels. Unlike most prior MI learning algorithms, MISSL makes use of the unlabeled data.

Full introductions - Abstracts

Example – conference paper:

ABSTRACT

Classic *Content-Based Image Retrieval* (CBIR) takes a single non-annotated query image, and retrieves similar images from an image repository. Such a search must rely upon a holistic (or global) view of the image. Yet often the desired content of an image is not holistic, but is localized. Specifically, we define *Localized Content-Based Image Retrieval* as a CBIR task where the user is only interested in a portion of the image, and the rest of the image is irrelevant. Many classic CBIR systems use relevance feedback to obtain images labeled as desirable or not desirable. Yet, these labeled images are typically used only to re-weight the features used within a global similarity measure. In this paper we present a localized CBIR system, ACCIO!, that uses labeled images in conjunction with a multiple-instance learning algorithm to first identify the desired object and re-weight the features, and then to rank images in the database using a similarity measure that is based upon individual regions within the image. We evaluate our system using a five-category natural scenes image repository, and benchmark data set that we have constructed with 25 object categories.

“Short Form” for Stating Problems

- A or B term is implied.
  - One of the terms is obvious to the audience
- Ex:
  - “During my visit to your infirmary on Sep 15, 1989, we observed the high mortality rate of 1 week old infants. This report investigates the cause of this problem and possible solutions.”

When is A or B term obvious?

- If one of terms involved the following, it is obvious
  - Efficiency
  - Low cost
  - Competitiveness in cost or performance
  - Products of good and even quality
  - Freedom from unrest, legal action, violations.
  - Elimination of wasted time, energy, or money
  - Simplicity rather than complexity

Example 1 – Short form

Object Extraction Using Limited Data Sources

1 Introduction

Object extraction, the process of isolating a portion of the image of interest to the user (the object) from the rest of the image (the background), is a critical step for many computer vision applications. "A significant feature of human visual recognition is that it can be trained with very few examples, cf. machine learning approaches. . .currently require hundreds if not thousands of examples." [62] We propose developing algorithms for object extraction that take a small set of images containing some visually similar object, and automatically identify, characterize, and extract this common object.

Choosing between full-form and short-form

- Know your audience!
- Assumed knowledge will change between scientific communities.

- Use short form
  - One term is known and obvious

- Use long form
  - One term may be known, but it not clear or not realized
  - Both terms are unknown.