Workshop on Information Retrieval in Context (IRiX) 29th July 2004

On the need for annotation-based image retrieval.

INOUE, Masashi
National Institute of Informatics

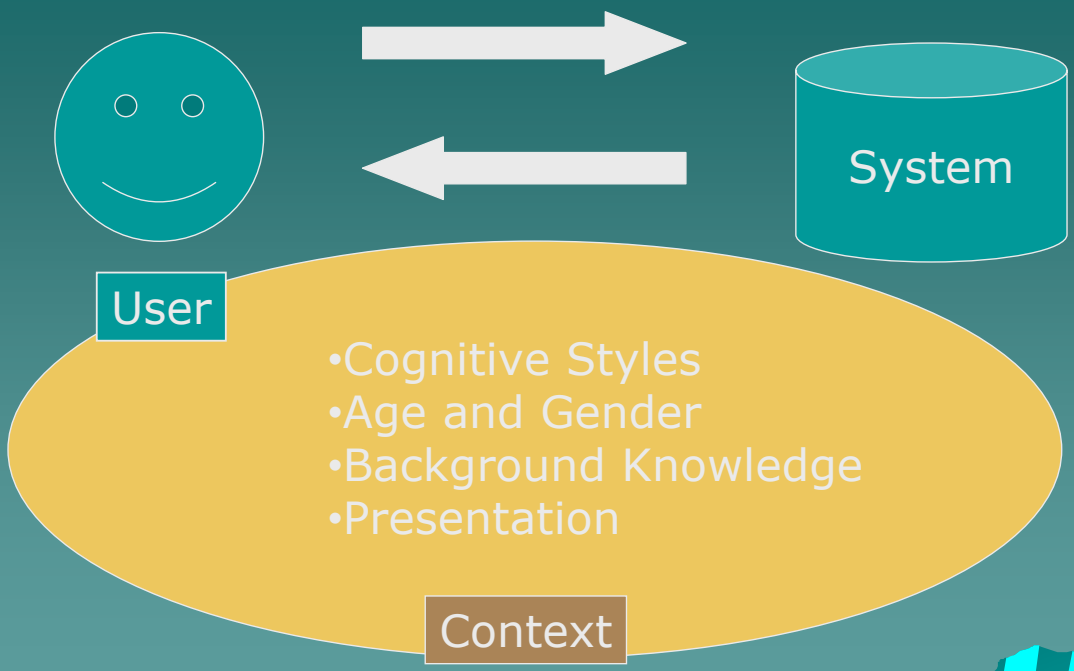
Outline

- Presence and functionality of context in automatic image retrieval
- Comparison of two types of image retrieval: CBIR and ABIR
- Identify two problems in ABIR
  - noise
  - scarcity in annotations

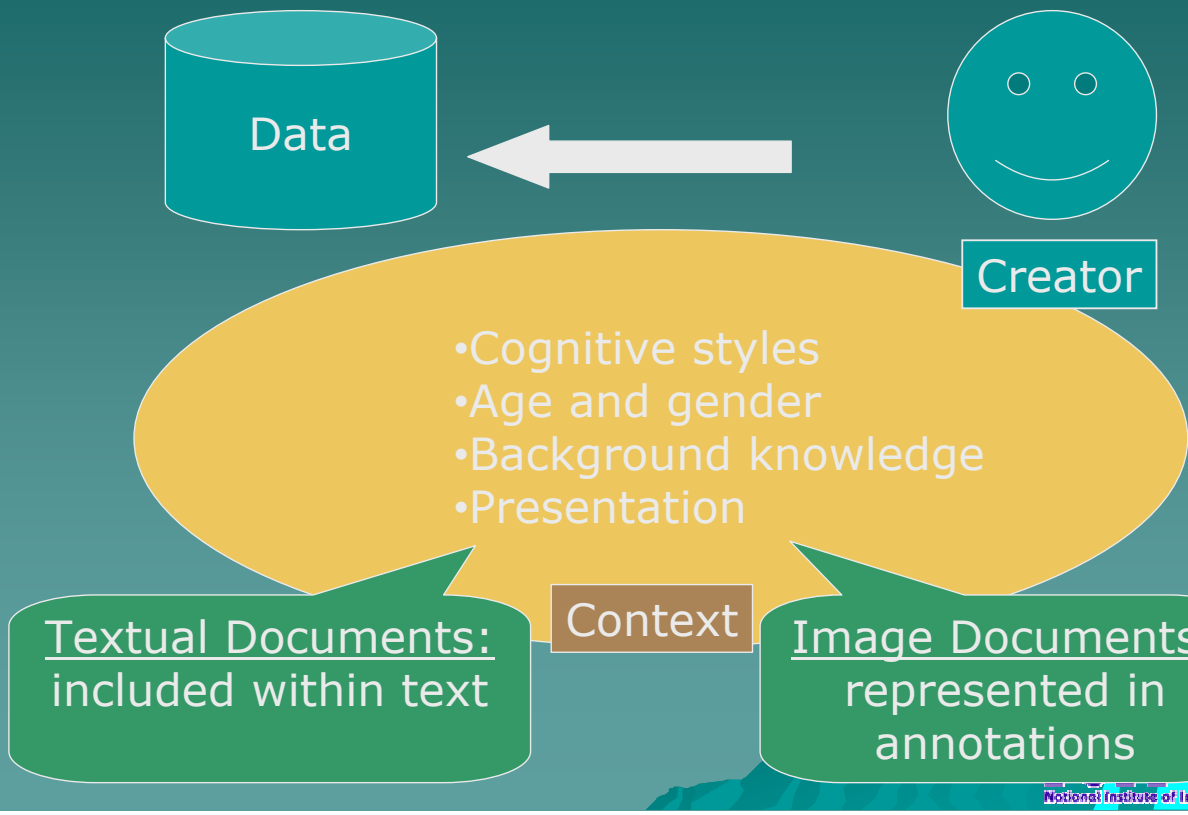
Context in Image Retrieval

- Definition of Context:
  - Subsidiary information surrounding and influencing the main data given explicitly for the task.
    (*e.g.*, time, place, history of interaction)
- Two types of context
  - Context in use
  - Context in creation

Context in Use



Context in Creation

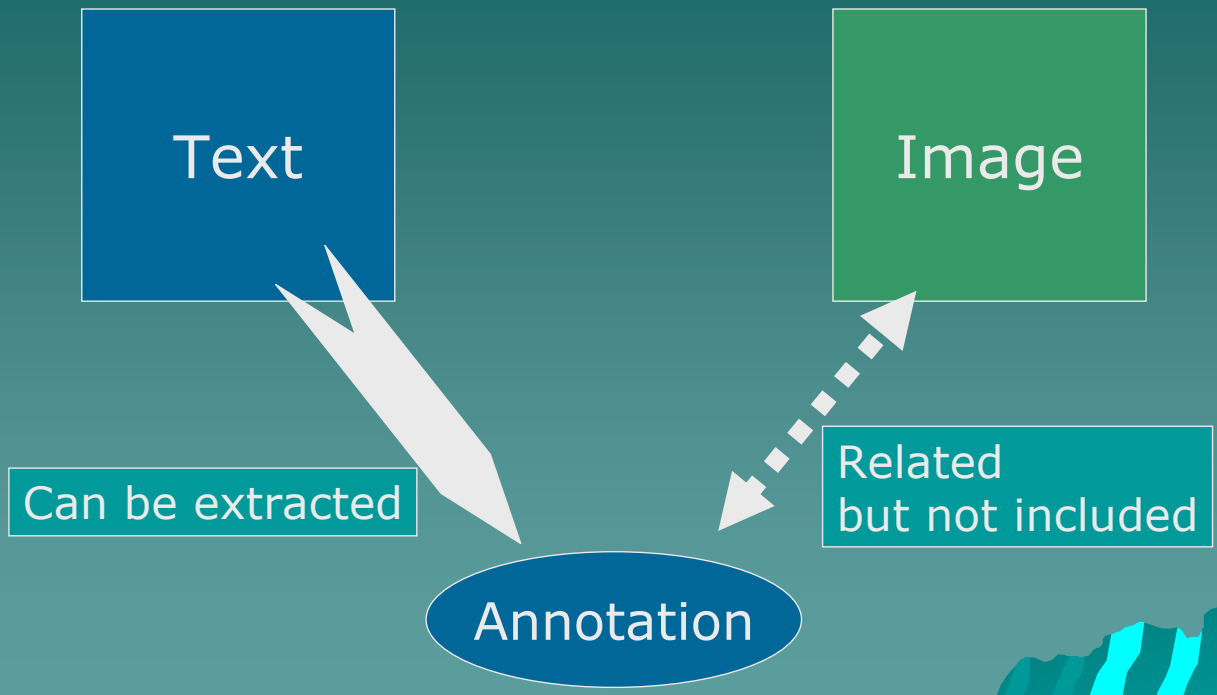


Annotation and Other Forms of Context Representation

- Metadata
  - Non-words: numbers or symbols
- Document Surrogate
  - title, abstract, category, etc.

These can be used as annotations.

Context-based Retrieval



Assumptions for Basic Image Retrieval

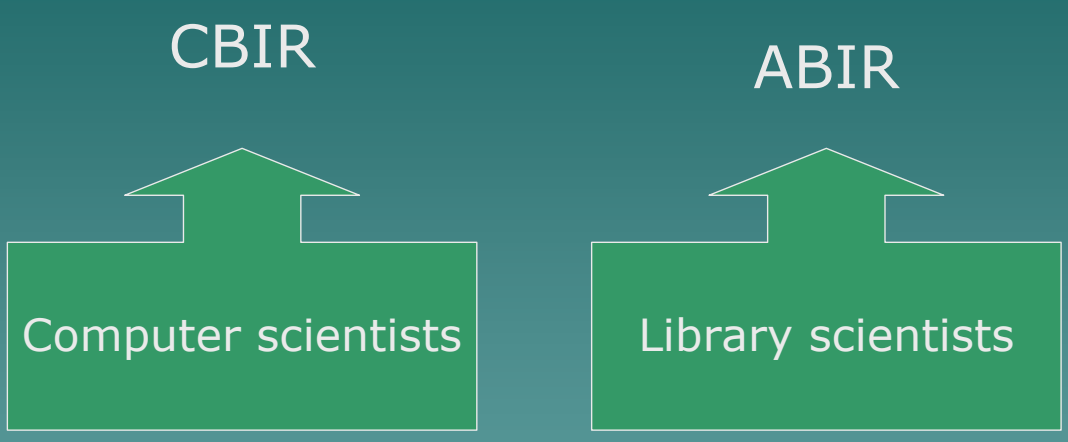
- Automatic Retrieval
  - Minimum human involvement
  - Without users' feedback effort
- Flexibilities in Queries
  - Minimum limitations in searching
  - Any queries using natural languages
- Based on current technologies
  - No perfect image understanding system

Two Types of Image Retrieval

- Content-based (CBIR)
- Based on the visual content of images
- Query by Example
  - Looking for content

- Annotation-based (ABIR)
- Based on words or other symbolic representations
- Query by Text
  - Looking for concept

Separation of CBIR and ABIR



[*e.g.*, Chu JASIST'01]

Two Types of Annotation Problems

Complete annotation by hand is impossible.

- Noisy Text Info.
  - *e.g.*, Images in HTML documents
  - Surrounding texts are abundant, but they are not necessarily relevant to the images.
- Scarce Text Info.
  - *e.g.*, Personal Photo Collection
  - The amount of manually assigned keywords is very often quite limited.

Solutions to Noisy Annotations

- Term extraction
  - Select keywords that may explain the content of images.
- Entirely text-based retrieval
  - Retrieve some texts relevant to queries, then extract images from them.

    e.g., Munson & Tsymbalenko '01

Solutions to Word Sparseness

1. Automatic indexing
   - A variant of the classification problem
2. Incorporation of external resources
   - Dictionaries and OoD Corpora
3. Exploiting available data
   - NLP (annotation)
   - Visual features (correlation)

Conclusions

- ABIR has wider applicability than CBIR and could be studied more.
- The problems in ABIR are noise in annotations and scarcity in annotations.
- Annotations can be viewed as the contextual information to the images and used in the ABIR framework.