

Introduction to Semantic (Multimedia) Annotation

Tutorial

Tobias Bürger (STI Innsbruck)

Kick-off, 07-08 April 09





Agenda

- Semantic Annotation – What? Why? How?
 1. Definition and characteristics
 2. Challenges in (multimedia) annotation
 3. Methodologies and tools





(1) Why? What?

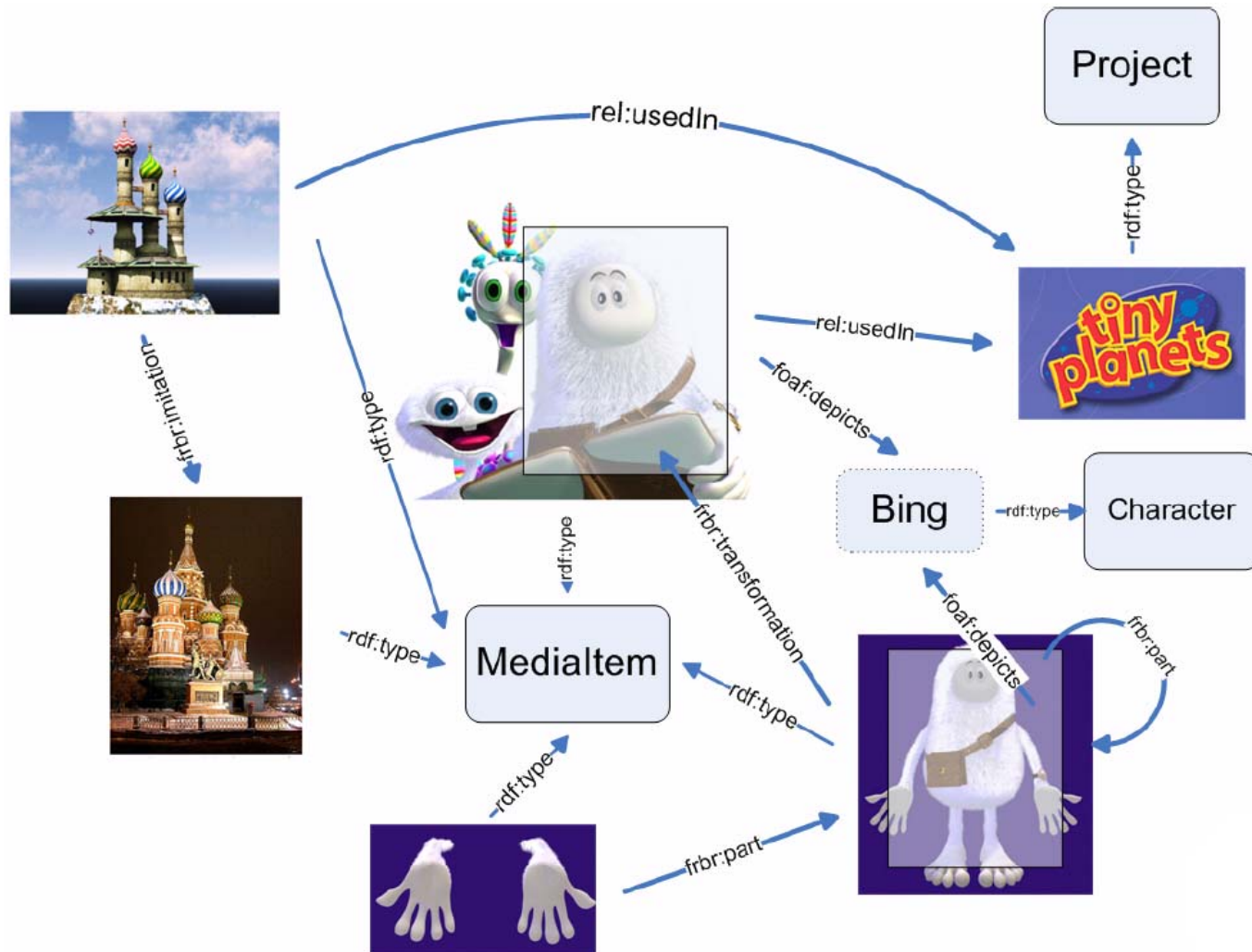


Why Multimedia Annotation?

- Make multimedia findable
 - Attach „meaning“
 - Make the „background story“ explicit (unleash the „hidden semantics“)
 - Put it into context („interlink“)



Annotate, Contextualize, Interlink





The Semantics of Semantic Annotation

- Annotation [noun]. *“A note by way of explanation or comment added to a text or diagram.”* (Source: New Oxford Dictionary of English)
- Forms
 - Text annotation
 - Link annotation
 - Semantic annotation
- Dimensions
 - Formal vs. informal
 - Explicit vs. tacit



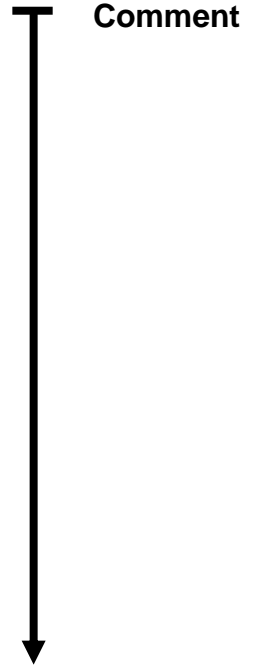
Classification of the Use of Annotations

- **Decoration:** Annotations are simply commentaries to resources.
- **Linking:** Annotations are a mechanism to provide link anchors.
- **Instance Identification:** The resource annotated is identified as an instance of a particular ontological primitive.
- **Instance Reference:** The Annotation makes an assertion about the subject of a resource.
- **Aboutness:** Annotations establish a loose association between ontological concepts and information resources.
- **Pertinence:** The annotation encodes additional information which is not subject of the resource itself.



Comment-based Approach to Annotation

- (1) Localize a region
- (2) Interpret the content



Degree of Formality

- (Attach yellow post-it to the region)
- Describe: Bing and Bong are traveling on their sofa; both seem to be happy.

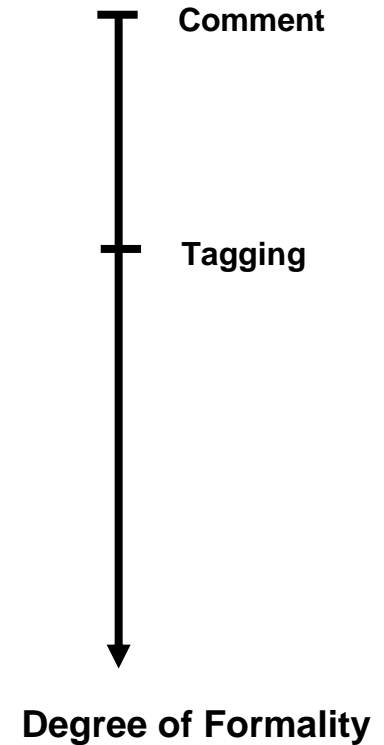


Tagging-based Approach to Annotation

- (1) Localize a region
- (2) Interpret the content



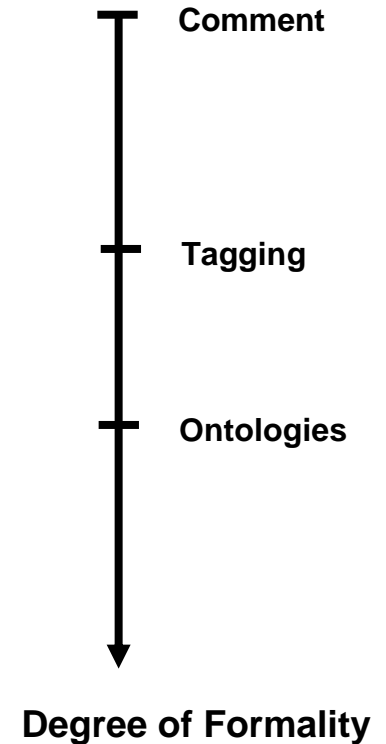
- Tags: bing, bong, happy, tinyplanets, sofa, vehicle





Semantic Web-based Approach to Annotation

- (1) Localize a region
- (2) Interpret the content



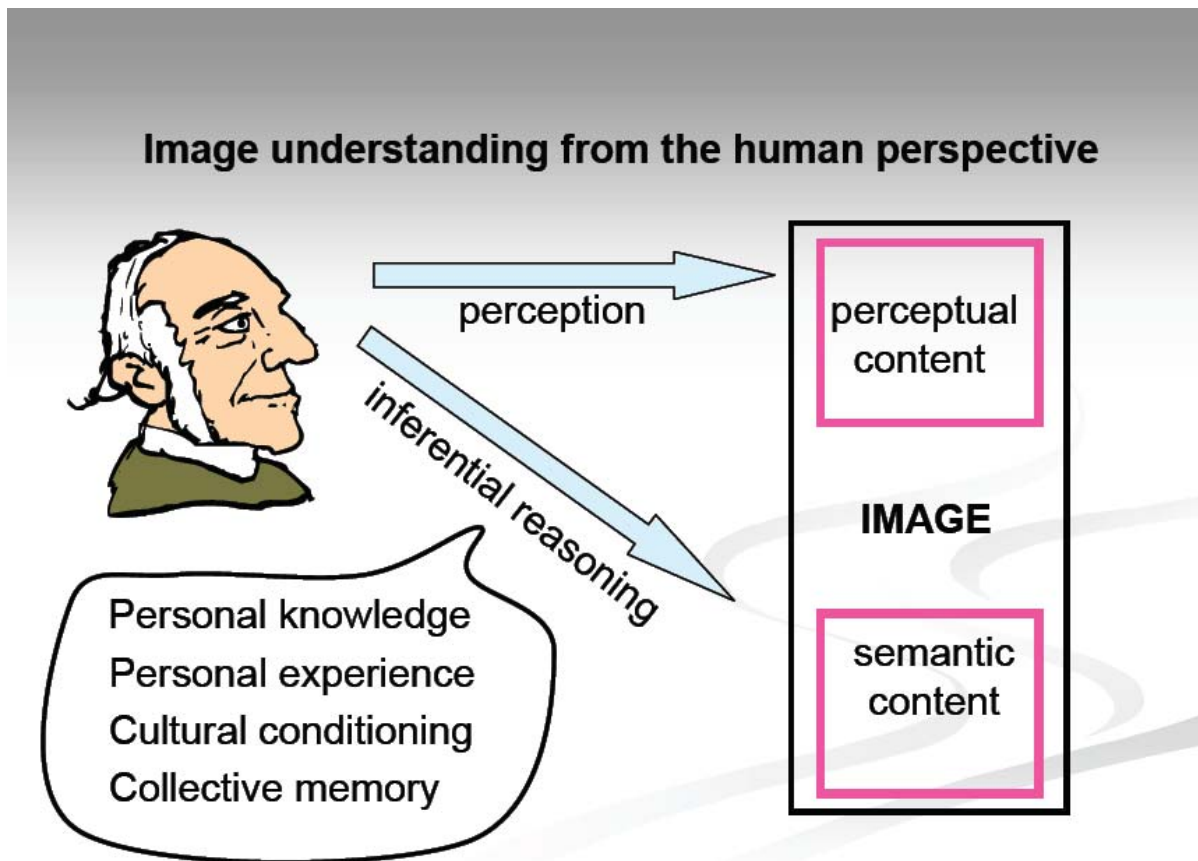
- :Region1 foaf:depicts mtp:Bing
mtp:Bing rdfs:label "Bing"
mtp:Bing rdf:type sal:VirtualCharacter



(2) Challenges: Difficulties and Complexity of Multimedia



Why is Multimedia Annotation Difficult?



Credits: P. Enser



The Semantic Gap

- 45.443272, 10.979848
- Juni 2005
- Verona
- Italy
- Julia
- Casa di Guilietta
- Spring
- Company Trip
- <Company Name>
- **1M pixel; dominant color: green**
- **Outdoor**
- **4 (5?) persons**

Manfred

Nic

Wolf



Tobias



Levels of Multimedia Description

- Metadata level
 - Administrative, technical, identification
- Content level
 - Textual descriptions, keywords, tags, semantic annotations
- Multimedia level
 - Low-level descriptors, e.g. Color histogram, shape descriptors, ...



Characterization of the Content Level

- Complexity: Semantic content of images
 - Object facet
 - Spatial facet
 - Temporal facet
 - Event/activity facet
 - Topic
 - Related concept/object class
 - Abstract concept
 - Context
- Sources: Where do we get this information from?
 - Manual classification / annotation
 - User Feedback
 - During image capturing/creation
 - From automatic analysis
 - Background knowledge on the Web



(3) How? Methodologies and Tools

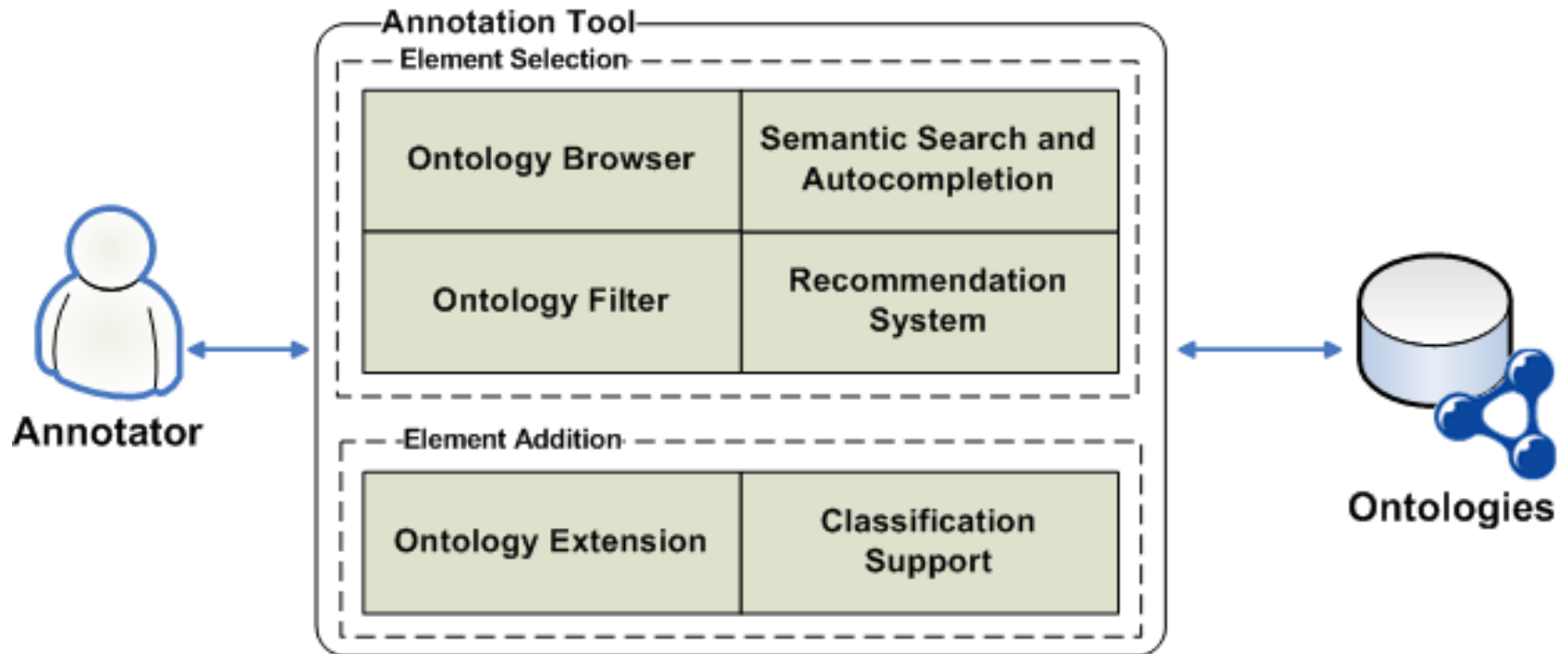


How-to Annotate?

- Annotation methodologies provide
 - descriptions of the process, participants/roles, and guidelines.
 - best practices how annotation should be performed.
 - allow a systematic, controlled operation of annotation projects.



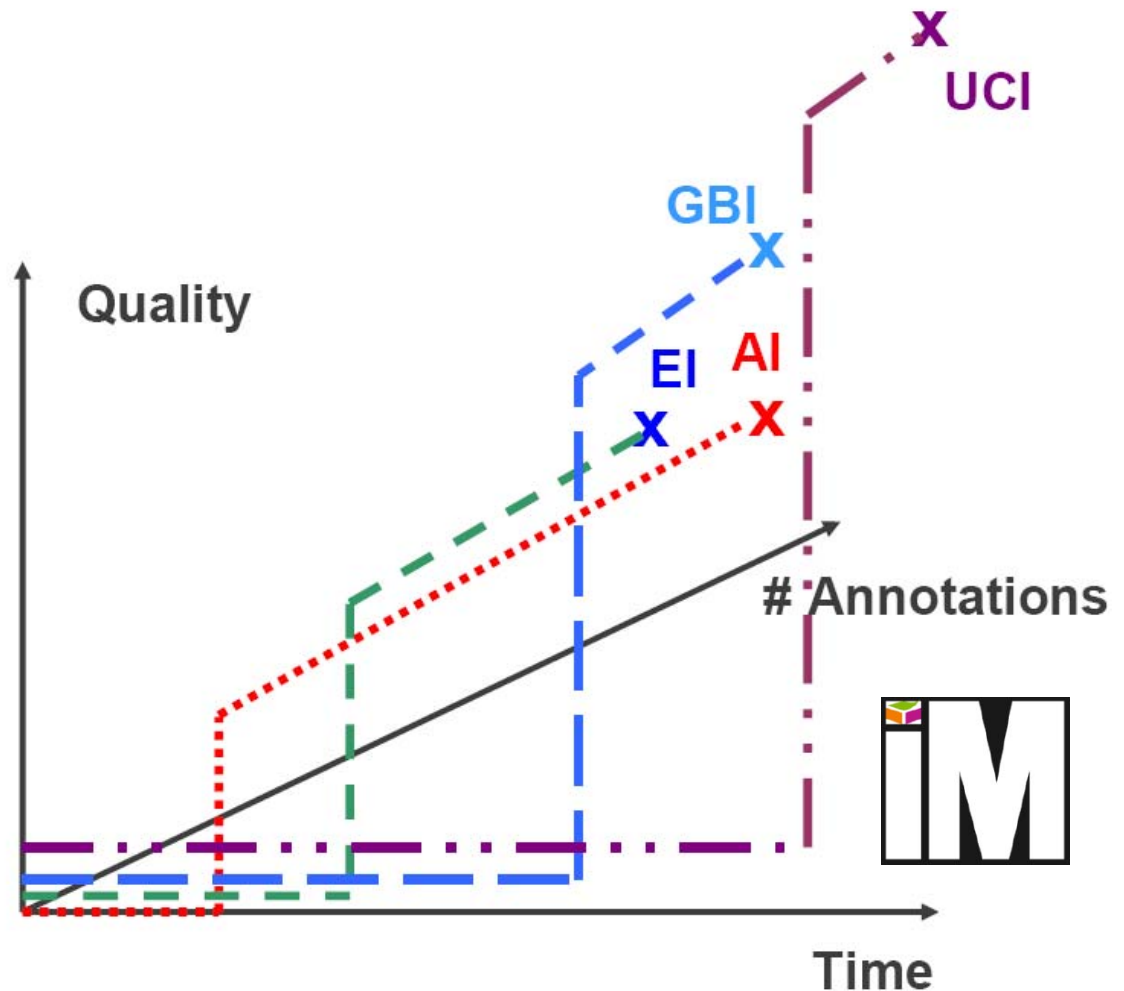
A User Centred Annotation Methodology for Multimedia Content





Automation in Annotation

- **Manual**
 - User-contributed (e.g., UCI)
 - Game-based (e.g., GBI)
- **Semi-automatic**
- **Automatic**
 - „Emergent Semantics“-based (e.g., EI)
 - Metadata-based (e.g., AI)
 - Multimedia-analysis-based





Manual Annotation: The SALERO Annotation Tool

What?

Who?

Where?

Character	Object	Location	Expression
Alien	Bag	Amsterdam	cold
Bing	Balloon	Athens	crying
Bong	Bed	Barcelona	cuddling
Magician	Bicycle	Berlin	cycling
	Blanket	Brussels	dancing
	Book	Dublin	giving
	Cake	Glasgow	holding
	Camera	Graz	hugging
	Car	Helsinki	laughing
	Chair	Innsbruck	open
	Cloud		pointing
	Control		pulling

Statements

Bing am

- dreaming <http://www.salero.eu/Ontology/Bubble.owl#dreaming>
- Amsterdam <http://www.salero.eu/Ontology/Bubble.owl#Amsterdam>
- Camera <http://www.salero.eu/Ontology/Bubble.owl#Camera>
- Icecream <http://www.salero.eu/Ontology/Bubble.owl#Icecream>

Tags

Add new tags:

Selected Tags:





Manual Annotation: The SALERO Bubble Interface





Semi-automatic Annotation

- CREAM
 - Content type: Web pages
 - Annotation support: Machine Learning to suggest annotations based on existing annotations
- M-Onto-Mat Annotizer / KAT
 - Content type: Images
 - Annotation support: Extraction of low-level features; suggestions based on existing annotations
- AKTIVEMedia
 - Content type: Images, videos, text, 3D
 - Annotation support: Concept suggestion based on content analysis



Semi-automatic Annotation: KAT

File Edit Window Help

Ontology Browser

- Thing
 - Location
 - Objects
 - Vehicles
 - Natural
 - Cloud
 - Water
 - Waterfall
 - Sea
 - Body-Of-Water
 - Stone
 - Sky
 - Sand
 - Plants
 - Snow
 - Sunset
 - Construction
 - Natural-Person
 - Man
 - Woman

Image Annotation Tool Content Browser

Annotation Queue

- 01153.jpg
- 01157.jpg
- 01159.jpg

Annotation Browser

<http://kspace.eu/ontologies/instances#id-481a5be...>

- Decomposition 1
 - Segment 1
 - Semantic 1
 - <http://kspace.eu/ontologies/instances...>
 - Segment 2
 - Segment 3

Ready.

Questions?

Tutorial

STI Innsbruck and University

Kick-off, 07-08 April 09



STI · INNSBRUCK



UNIVERSITY
OF TRENTO - Italy

