The semantic gap is the lack of coincidence between the information that one can extract from the visual data and the interpretation that the same data has for a user in a given situation (Smeulders et al., 2000, p. 1349).

This definition can be generalized to digital media objects of any modality without loss of validity.

The semantic gap is not bridged and may never be. One of the main reasons is the role of ambiguity. The more abstract a semantic concept is, the more subjective interpretations are possible, for example, due to cultural context-sensitivity. Eakins (1996) distinguishes three levels of features:

- **Level 1**: primitive features; for example, color, texture and shape;
- **Level 2**: derived (or logical) features; for example, containment objects of a given type or individual objects;
- **Level 3**: abstract attributes; for example, named events or types of activities, or emotional or religious significance.

The higher the level the more subjective, and thus ambiguous, annotations become. State of the art annotation extraction algorithms reach level 2. Level 3 algorithms are currently only applicable in clearly defined and distinguishable (narrow) domains.

The most popular approach is to start with level 1 features and aggregate those into higher level semantically meaningful concepts. Common intuition is that annotations of multiple modalities should be combined, hopefully improving and enforcing each other’s findings.

A wide variety of extraction algorithms can be found in scientific publications, mostly dedicated to one specific modality (Del Bimbo, 1999; Foote, 1999; Jurafski & Martin, 2000). Models to combine features range from hard-coded rules to machine learning algorithms (Mitchell, 1997). Examples of frameworks encompassing these techniques are **Cobra** (Petkovic, 2003) and the **compositional semantics** method used in Colombo, Del Bimbo, and Pala (1999).

Figure 1 shows an annotation example, which uses various extraction algorithms: detectors to extract basic
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