SPEAKER:

Dr. Lewis Griffin

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DATE:

Wednesday the 3rd of August 2011

TIME:

15:15 - 16:15

LOCATION:

Heriot-Watt University, Earl Mountbatten Building; room 3.06

TITLE:

Extrapolation of visual appearance on the basis of semantic relatedness

ABSTRACT

Modern adult humans have knowledge of 10^4-10^5 categories of entity, acquired at an average rate of 1-10 per day throughout childhood. Such semantic knowledge has modality specific aspects such as appearance and taste; and also, it has been hypothesized, an amodal relational aspect which codifies the relatedness of different categories. Semantic relatedness may be learnable by observing language use, and so does not depend on observing labelled instances.

In contrast, learning modality specific knowledge in general requires labelled instances presented in the appropriate modality.It is unclear how knowledge of so many appearances could be acquired at such a rate given the rarity of unambiguously labelled examples – an example of what is called ‘Plato’s problem’.

Here we show that seen entities can be identified as belonging to categories with unknown appearance by using semantic relatedness to extrapolate from already known appearances. This is possible because of a tendency for things to look more similar the more related they are – which is a common sense belief but previously unsubstantiated. Our results demonstrate the possibility of such learning by extrapolation, a novel mode of learning where previously acquired knowledge facilitates the acquisition of new knowledge, and stresses the possible role in this of linguistic statistics. This should be useful in the formulation of educational approaches grounded in psychology, machine learning and neuroscience, and in the design of artificial learning algorithms for Computer Vision systems with human capabilities.