SEMANTIC PROCESSING

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Semantics is the study of meaning. A large number of naturally occurring phenomena follow certain semantic rules. For example, the semantics of human speech, semantics associated with an image of a scenery, semantics of natural language. Accurate semantic processing is required for a number of high-level information understanding tasks such as inferring author sentiment given a blog or review, searching through a collection of documents, images and videos, translating text in one language to another. For example, it may be hard to infer the positive sentiment expressed by the statement "The Prince of Egypt succeeds where other movies have failed" without the aid of semantics based inference.

In the last few years, there has been an explosion in the amount of human-generated content on the Internet and an exponential growth in the number of times a user turns to the Internet to perform a daily activity. It is estimated that we create about 1.6 billion blog posts, 60 billion emails, 2 million photographs and 200,000 video on the Internet everyday. These days, users read the news, watch television and stay connected to their friends and family via the Internet. Yet users need for Internet based applications is now more than ever before. Satisfying these ever increasing demands requires a deeper semantic understanding of all the content on the Web. This session will focus on semantics processing algorithms for natural language and images as they constitute a large majority of the data on the Internet.

In the context of natural language, there are many different levels of semantic processing ranging from word and sentence level analysis to more complex analysis of discourse. The task of understanding the meaning of words and their relationships falls under the former, whereas ability to infer the meaning of pronouns (e.g, he, she) and inferring sentiment expressed by a paragraph are examples of the later. Ani Nenkova (University of Pennsylvania) will survey some of the techniques that have been successfully applied automatic text understanding and will point out some of the outstanding challenges. Her talk will also shed light on the impact that text quality has on semantic processing algorithms.

The proliferation of Internet use has led to the creation of large bodies of knowledge such as Wikipedia. Further the social aspect of the Web has resulted in collaboratively generated content, e.g., Yahoo! Answers. Accurate semantic processing of such sources of knowledge can lead to knowledge-rich approaches to information access that go far beyond the conventional word-based methods. Evgeniy Gabrilovich (Yahoo! Research) will talk about using collaboratively generated content for representing the semantics of natural language, and will discuss new information retrieval algorithms enabled by this representation.

Images and video form a key component of the overall Internet experience. Accurate semantic understanding of images and video can lead to faster and better search. Samy Bengio (Google Research) will talk about algorithms that learn how to "embed" images and their descriptions (labels or annotations) within a common space. Such a space can be used to find the nearest

annotations to a given image. His talk will also show how one can construct a “visio-semantic” tree from such annotations.

Tables, plots, graphs and diagrams are yet another way in which information is represented on web-pages. These data-driven images are complicated objects that have a close-relationship with the surrounding text. For example, they may be used to illustrate the text's conclusions or provide additional data. Unfortunately, state-of-the-art algorithms treat diagrams in the same way as photos or illustrations. As a result, searching for a relevant diagram online often yields very poor-quality results. Michael J. Cafarella (University of Michigan) will talk about smart semantic processing algorithms for plots, graphs and diagrams. He will also discuss ways in which such data can be summarized to make it easier for end-user consumption.