



SEMINARIO

4 Giugno 2014, ore 16:00, AULA FA2C

Smart Data enabling Personalized Digital Health

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Abstract: The proliferation of smartphones and sensors, the continuous monitoring of physiology and environment (personal health signals), notifications from public health sources (public health signals), and more digital access to clinical data, are resulting in massive multisensory and multimodal observational data. The technology has significant potential to improve health and well-being, through early detection, better diagnosis, effective prevention and treatment of a disease; and improved the quality of life. However, to make this personalized digital medicine a reality, it is crucial to derive actionable insights from data including heterogeneous and fine-grained observations.

At Kno.e.sis, we have collaborations with clinicians in growing number of specializations (Cardiovascular, Pulmonology, Gastroenterology) to study personalized health decision making that involve the use of real-world patient data, deep background knowledge and well targeted clinical applications. For example:

- For a patient discharged from hospital with Acute Decompensated Heart Failure, can we compute post hospital discharge risk factor to reduce 30-day readmissions?
- For children with Asthma, can we predict an impending attack to enable actions that prevent an attack reducing the need for post-attack symptomatic relief?
- For Parkinson's Disease, can we characterize the progression to adjust medication and therapeutic changes?

The above provides the context for a research agenda around what I call Smart Data, which (a) provides value from harnessing the challenges posed by volume, velocity, variety and veracity of Big Data, in-turn providing **actionable information** and improve **decision making**, and/or (b) is focused on the actionable value achieved by human involvement in data creation, processing and consumption phases for improving the [Human experience](#). In describing Smart Data approach to above health applications, I will cover the following technical capabilities that adds semantics to enhance or complement traditional NLP and ML centric solutions:

- Semantic Sensor Web- including semantic computation infrastructure, ability to semi-automatically create domain specific background knowledge (ontology) from unstructured data (e.g., EMR), and automatically do semantic annotation of multimodal and multisensory data
- Semantic perception – convert low level signals into higher level abstractions using IntellegO framework that utilizes domain knowledge and hybrid abductive/deductive reasoning
- Intelligence at Edge - perform scalable and efficient semantic computation on resource constrained devices

Speaker Bio: [Amit P. Sheth](http://knoesis.org/amit) (<http://knoesis.org/amit>) is an educator, researcher, and entrepreneur. He is the LexisNexis Eminent Scholar and founder/executive director of the Ohio Center of Excellence in Knowledge-enabled Computing ([Kno.e.sis](#)). Kno.e.sis conducts research in social/sensor/semantic data and Web 3.0 with real-world applications and multidisciplinary solutions for translational research, healthcare and life sciences, cognitive science, material sciences, etc. Kno.e.sis' activities have resulted in Wright State University being recognized as a [top organization in the world on World Wide Web](#) in research impact. Prof. Sheth is one of top authors in Computer Science, World Wide Web and databases (cf: Microsoft Academic Search; Google H-index=85). His research has led to several commercial products, many real-world applications, and two earlier companies with two more in early stages. One of these was Taalee/Voquette/Semagix, which was likely the first company (founded in 1999) that developed Semantic Web enabled search and analysis, and semantic application development platforms. He is founding EIC of IJSWIS and co-EIC of IJSWIS and DAPD.



SEMINARIO

5 Giugno 2014, ore 11:00
AULA FA2A

Transforming Big Data into Smart Data:

Deriving Value via harnessing Volume, Variety, and Velocity using semantic techniques and technologies

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Abstract:

Big Data has captured a lot of interest in industry, with anticipation of better decisions, efficient organizations, and many new jobs. Much of the emphasis is on the challenges of the four Vs of Big Data: Volume, Variety, Velocity, and Veracity, and technologies that handles volume, including storage and computational techniques to support analysis (Hadoop, NoSQL, MapReduce, etc), and. However, the most important feature of Big Data, the *raison d'etre*, is none of these 4 Vs -- but **value**. In this talk, I will forward the concept of Smart Data that is realized by extracting value from a variety of data, and how Smart Data for growing variety (e.g., social, sensor/IoT, health care) of Big Data enable much larger class of applications that can benefit not just large companies but each individual. This requires organized ways to harness and overcome the four V-challenges. In particular, we will need to utilize metadata, employ semantics and intelligent processing, and go beyond traditional reliance on ML and NLP.

For harnessing volume, I will discuss the concept of [Semantic Perception](#), that is, how to convert massive amounts of data into information, meaning, and insight useful for human decision-making. For dealing with Variety, I will discuss experience in using agreement represented in the form of ontologies, domain models, or vocabularies, to support semantic interoperability and integration. Lastly, for Velocity, I will discuss somewhat more recent work on [Continuous Semantics](#), which seeks to use dynamically created models of new objects, concepts, and relationships and uses them to better understand new cues in the data that capture rapidly evolving events and situations.

Smart Data applications in development at Kno.e.sis come from the domains of personalized health, energy, disaster response and smart city. I will present examples from a couple of these.

Speaker Bio:

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