Supporting a Web Science Education

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ABSTRACT

As the field of Web Science matures, it is critical to develop an infrastructure to support students interested in understanding the future of information technologies. More importantly, it is imperative to develop classes, a curriculum, and research opportunities that foster inquiry into how such a phenomenon, such as the Web, can and will impact society as a whole. Thus, we present the Rensselaer Polytechnic Institute's Information Technology and Web Science (ITWS) discipline and its Web Science Research Center (RPI-WSRC). The ITWS program provides the foundational educational program, and WSRC provides an avenue for further research into Web Science related issues. This submission seeks to address topic one of the workshop: "Web Science Education Activities".

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ACM Classification Keywords

K.3.2. Computer and Information Science Education

General Terms

Human Factors; Web Science; Web Science Education

INTRODUCTION

The Web is the largest and most used human information construct developed in the history of computing. Its transformative property, which permeates societies, economies, states and the individual, is the very reason for the formation of the Web Science discipline. For as Arroyo notes, the Web is *not* a thing nor a verb or a noun [1]. Instead its evolution manifests a performance between actors from society and the Web's architecture [1][2]. Thus, an education focused on the Web must study it as both a *phenomenon* and as an *engineering* problem. The Information Technology and Web Science (ITWS) discipline at Rensselaer Polytechnic Institute aims to incorporate both of these aspects. The RPI Web Science Research Center [3] aims to support Web Science research and provides a venue for engaging and educating students in web science by providing project options and an evening education series[1]. The following contribution provides an overview of RPI's ITWS program and Web Science Research Center. Our intent is to share our best practices and experiences in developing the necessary infrastructure to promote a Web Science education.

INFORMATION TECHNOLOGY AND WEB SCIENCE AT RPI

Created in 1998, RPI's ITWS department offers two degree programs, a Bachelor of Science in ITWS and a Master of Science in Information Technology. Both programs are highly interdisciplinary. The goal is provide students with a broader understanding for the interplay between the social, scientific, and the technical issues underlying the Web [4]. Moreover, students select a specific concentration fulfilled by completing eight courses in a selected field. These fields include (but are not limited to): the arts, civil engineering, cognitive science, communication, computer hardware, computer networking, data science, economics, finance, psychology, medicine, and web science, etc.

The curriculum is heavily project-oriented and offers hands-on, real world experience through internships, co-ops, Capstone projects, etc. Additionally a course titled, "Web Science", is offered in the Spring semesters to undergraduates which crosses both ITWS and Computer Science disciplines. Moreover, a research track is also available for students interested in exploring how information technologies, like the Web, impact society. For example, current research on information systems and human computer interaction (HCI) are conducted in collaboration with Rensselaer's Social and Behavioral Research Laboratory. The goal is to matriculate students armed with not just a foundation in ITWS but also with a specific expertise and an understanding of the potential impact certain technologies may have on society. In May 2012, the ITWS undergraduate program graduated 22

[1] For more information TWed, please visit <http://tw.rpi.edu/web/twed>

students while the Master's program admitted 35 new graduates in the Fall of 2012 [5].

WEB SCIENCE RESEARCH CENTER

Launched in 2011 as one of 10 international founding web science research centers, the RPI WSRC's mission is to *study* the fundamental principles that drive the Web; to *engineer* new infrastructure that extends the Web; and to *educate* the next generation of citizens who will build, govern, and use the Web, recognizing its ever-changing political, educational, societal, and scientific needs (WSNet presentation). The RPI WSRC compliments the core tenets of the ITWS discipline providing students interested in research the opportunities and outlet to pursue specific Web Science issues.

Currently, the center supports a plethora of research areas including (but not limited to): semantic eScience, data information and visualization, knowledge provenance, Health Web Science, semantic data frameworks, social machines, etc. Contributors to the center range from undergraduate researchers to post-doctoral candidates to visiting fellows and faculty. Our work exemplifies the need to develop tools, methods and processes that streamline collaborative research among multiple disciplines.

This is best illustrated by the center's creation of four themed Web Observatories - science data, health and life sciences, open government, and social spaces. Throughout these Web Observatories, researchers are provided with tools, methods and processes that may aide in answering complex questions pertinent in each topic. For example, the "Social Spaces Web Observatory" features the Twitter Network Observatory, which aims to structure social data. This semantically-enabled platform aggregates, stores, and analyzes Twitter data by converting it to RDF linked data and re-publishing it via a TWC LOGD SPARQL endpoint. This enables researchers the ability to access the data, to analyze the data graph, and to create visualizations. It also allows projects, to understand leverage social media networks to do things such as identify key contributors on topics, identify trends, and gather requirements such as those used in our NIST funded first responder project [6].

CONCLUSION

In this contribution, we presented RPI's Information Technology and Web Science program and its Web Science Research Center. We offer both examples as best practices in constructing a set of courses, curriculum, and research programs focused on the impact of information technologies like the Web. We discussed key programmatic elements of the ITWS discipline which encourages students to take a 360 view of technology, incorporating both technical and social sciences courses. Moreover, the WSRC compliments and extends the foundation set by the ITWS program by providing an additional avenue for students interested in researching the Web. We are, however, conscientious of future challenges that lay ahead, including building new and relevant course work as well as attracting more students to the program. Balancing the need to produce technically competent students with intangible qualities like knowledge-acquisition requires a continuous reflection of the program's mission and efficacy. Furthermore, the ever-evolving, fast-paced nature of information technology presents a unique hurdle for educators in this space as the competition grows from self-taught programmers and the adoption of massive online open courses (MOOCs).

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