A semantic sommelier: Wine application highlights the power of Web 3.0

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In the restaurant of the future, you will always enjoy the perfect meal with that full-bodied 2006 cabernet sauvignon, you will always know your dinner companions' favorite merlot, and you will be able to check if the sommelier's cellar contains your favorite pinot grigio before you even check your coat. These feats of classic cuisine will come to the modern dinner through the power of Semantic Web technology.

Web scientist and Rensselaer Polytechnic Institute Tetherless World Research Constellation Professor Deborah McGuinness has been developing a family of applications for the most tech-savvy wine connoisseurs since her days as a graduate student in the 1980s—before what we now know as the World Wide Web had even been envisioned.

Today, McGuinness is among the world's foremost experts in Web ontology languages. These languages are used to encode meanings in a language that computers can understand. The most recent version of her wine application serves as an exceptional example of what the future of the World Wide Web, often called Web 3.0, might in fact look like. It is also an exceptional tool for teaching future Web Scientists about ontologies.

"The wine agent came about because I had to demonstrate the new technology that I was developing," McGuinness said. "I had sophisticated applications that used cutting-edge artificial intelligence technology in domains, such as telecommunications equipment, that were difficult for anyone other than well-trained engineers to understand." McGuinness

took the technology into the domain of wines and foods to create a program that she uses as a semantic tutorial, an "Ontologies 101" as she calls it. And students throughout the years have done many things with the wine agent including, most recently, experimentation with social media and mobile phone applications.

Today, the semantic sommelier is set to provide even the most novice of foodies some exciting new tools to expand their wine knowledge and food-pairing abilities on everything from their home PC to their smart phone. Evan Patton, a graduate student in computer science at Rensselaer, is the most recent student to tinker with the wine agent and is working with McGuinness to bring it into the mobile space on both the iPhone and Droid platforms.

The agent uses the Web Ontology Language (OWL), the formal language for the Semantic Web. Like the English language, which uses an agreed upon alphabet to form words and sentences that all English-speaking people can recognize, OWL uses a formalized set of symbols to create a code or language that a wide variety of applications can "read." This allows your computer to operate more efficiently and more intelligently with your cell phone or your Facebook page, or any other webpage or web-enabled device. These semantics also allow for an entirely new generation in smart search technologies.

Thanks to its semantic technology, the sommelier is input with basic background knowledge about wine and food. For wine, that includes its body, color (red versus white or blush), sweetness, and flavor. For food, this includes the course (e.g. appetizer versus entrée), ingredient type (e.g. fish versus meat), and its heat (mild versus spicy). The semantic technologies beneath the application then encode that knowledge and apply reasoning to search and share that information. This semantic functionality can now be exploited for a variety of culinary purposes, all of which McGuinness, a personal lover of fine wines, and Patton are

working together on.

Having a spicy fish dish for dinner? Search within the system and it will arrive at a good wine pairing for the meal. Beyond basic pairings, the application has strong possibilities for use in individual restaurants, according to McGuinness, who envisions teaming up with restaurant owners to input their specific menus and wine lists. Thus, a diner could check menus and wine holdings before going out for dinner or they could enter a restaurant, pull out their smart phone, and instantly know what is in the wine cellar and goes best with that chef's clams casino. Beyond pairings, diners could rate different wines, providing fellow diners with personal reviews and the restaurateur with valuable information on what to stock up on next week. Is it a dry restaurant? The application could also be loaded up with the inventory within the liquor store down the street.

Beyond the table, the application can also be used to make personal wine suggestions and virtual wine cellars that you could share with your friends via Facebook or other social media platforms. It could also be used to manage a personal wine cellar, providing information on what is a peak flavor at the moment or what in your cellar would go best with your famous steak au poivre.

"Today we have 10 gadgets with us at any given time," McGuinness said. "We live and breathe social media. With semantic technologies, we can offload more of the searching and reasoning required to locate and share information to the computer while still maintaining personal control over our information and how we use it. We also increase the ability of our technologies to interact with each other and decrease the need for as many gadgets or as many interactions with them since the applications do more work for us."