Identifying Health Threats from the Ingredients in our Food

Vipula Rawte*, Kiana McNellis*, Trlice Encarnacion*, Elisa Kendall, Deborah McGuinness*

(*Rensselaer Polytechnic Institute 110 8th St, Troy, NY, 12180 United States)

ABSTRACT

Research in web science has been important, but research in health web science is also gaining significance. Scientists have recognized that the web is not only limited to creating websites, writing blogs and connecting people but also can be used as a platform for making people conscious of their health and well-being. As a majority of the world is connected to the web that is accessible from almost any gadget, a web-based medium is, therefore, most effective for creating health awareness. A pertinent problem is that consumers are worried about the ingredients present in packaged foods. As global supply chains provide ingredients across the globe and food processing has become more sophisticated, consumers do not have an easy way of knowing what are the constituents of their food and how they were processed. A question which concerns almost everyone is “How can we make sure if food is safe to consume?” Since web science is multidisciplinary and no such solution exists, the idea to address this problem is to propose an ontology-enabled Semantic Web application. The inputs will be product name/ID/barcode/ingredient(s), and output will be the health impacts and/or healthy alternatives. The benefits are automatic querying and reasoning in a way the computer can understand without human intervention. The proposed approach uses an ontology to represent the web of linked data and support reasoning related to food safety. The ontology contains classes such as Food, Ingredient, Allergen, Certification, User, HealthHazard, HealthyFoodAlternative, etc., subclasses such as Preservative, ArtificialColor, Additive, ImprovingAgent, ToxicIngredientToAvoid, CarcinogenicIngredientToAvoid, GMO, etc. and relationships such as constitutes, isCertifiedWith, hasHealthyAlternative, hasIngredient, etc. between them. The web portal will use SPARQL queries to provide information concerning health hazards related to packed foods and suggestions for healthier alternatives. Additionally, stakeholders like supermarkets, restaurants, Food & Heath boards and Food production companies can rely their buying decision on this application.

MOTIVATION

Are there any health threats associated with the ingredients in the food we consume? If I have allergies, is this food okay for me to consume?

PROPOSED SYSTEM FLOW

Fig. 1. Ontology Based System for identifying threats from the packaged food ingredients

ONTOGY - CLASSES

ontology classes of Food, Ingredient, Allergen, Certification, User, HealthHazard, HealthyFoodAlternative, etc., subclasses of Preservative, ArtificialColor, Additive, ImprovingAgent, ToxicIngredientToAvoid, CarcinogenicIngredientToAvoid, GMO, etc. and relationships such as constitutes, isCertifiedWith, hasHealthyAlternative, hasIngredient, etc. between them. The web portal will use SPARQL queries to provide information concerning health hazards related to packed foods and suggestions for healthier alternatives. Additionally, stakeholders like supermarkets, restaurants, Food & Heath boards and Food production companies can rely their buying decision on this application.

ONTOGY - PROPERTIES

Fig. 2. Ontology showing different classes

Fig. 3. Ontology showing properties between different classes

USAGE SCENARIOS

(A) Lisa wants to buy Mars M&M candies for her kid and wants to make sure if it is safe. Mars M&M candies is a Food and hasIngredient Additive which has subclass ColorAdditive which has subclass CertifiedColor which has instances Blue1, Blue2, Red40, Yellow5 and Yellow6 found in US M&M and these instances have hasHealthHazard ChromosomalDamage, BrainTumor, Lymphomas, Hyperactivity, Asthma, Insomnia, Agression, ThyroidTumor and thus M&M candies are categorized as a “Health Hazard” and NOT safe to consume.

(B) Priya wants to buy Healthy Choice Chicken Noodle Soup and wants to make sure if it is safe. Healthy Choice Chicken Noodle Soup is a Food and hasIngredient Additive which has subclass FlavorAdditive which has subclass FlavorEnhancer which has instances HydrolyzedVegetableProtein found in Healthy Choice Chicken Noodle Soup and this instances has further hasIngredient MonoSodiumGlutamate which has hasHealthHazard Headache, Eczema, WeaknessOfArmsOrLegs, BurningSensationOfMouthHeadNeck and thus Healthy Choice Chicken Noodle Soup is categorized as a “Health Hazard” and NOT safe to consume.