

Computer Algebra-based RBES personalized menu generator

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People have many constraints concerning the food they eat. These constraints can be based on religious beliefs, be due to food allergies or to illnesses, or can be derived just from personal preferences. Therefore, preparing menus at hospitals and restaurants can be really complex. Another special situation arises when traveling abroad. It is not always enough to know the brief description in the restaurant menu or the explanation of the waiter. For example, “calamares en su tinta” (squid in its own ink) is a delicious typical Spanish dish, not well-known abroad. Its brief description would be “squid with boiled rice in its own (black) ink”. But an ingredient (included in a small amount, in order to thicken the sauce) is flour, a fact very important for someone suffering from celiac disease. Therefore, we have considered that it would be very interesting to develop a Rule Based Expert System (RBES) to address these problems. The rules derive directly from the recipes and contain the information about required ingredients and names of the dishes. We distinguish: ingredients and ways of cooking, intermediate products (like “mayonaisse”, that doesn’t always appear explicitly in the restaurants’ menus) and final products (like “seafood cocktail”, that are the dishes listed in the restaurant menu). For each customer at a certain moment, the input to the system are: on one hand, the stock of ingredients at that moment, and on the other, the religion, allergies and restrictions due to illnesses or personal preferences of the customer. The RBES then constructs a “personalized restaurant menu” using set operations and knowledge extraction (thanks to an algebraic Groebner bases-based inference engine[1]). The RBES has been implemented in the computer algebra system *MapleTM18* (using its convenient *Embedded Components*) and can be run from computers and tablets using *MapleTM* or the *MapleTMPlayer*.

References

- [1] E. Roanes-Lozano, L.M. Laita, A. Hernando and E. Roanes-Macías, *An Algebraic Approach to Rule Based Expert Systems*, RACSAM Rev. R. Acad. Cien. Serie A. Mat. **104**, 1, pp 19-40 (2010). DOI: 10.5052/RACSAM.2010.04