POST-probability weighted method for matching the Internet recipe ingredients with food composition data

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Motivation

- Nowadays, one of the major causes of global health problems is strongly related to **poor** and **unbalanced diet**.
- A lot of information about **healthier diet** is presented in different forms, available in books, magazines, television and Internet.
- People are lacking of knowledge about all **nutrition principles** and also lack of time and motivation to explore the resources where this kind of information is presented.
- **Food composition databases (FCDBs)** provide detailed information on nutritional composition of food.
- A new method for **matching the recipe ingredients** extracted from Internet to nutritional data from FCDBs.

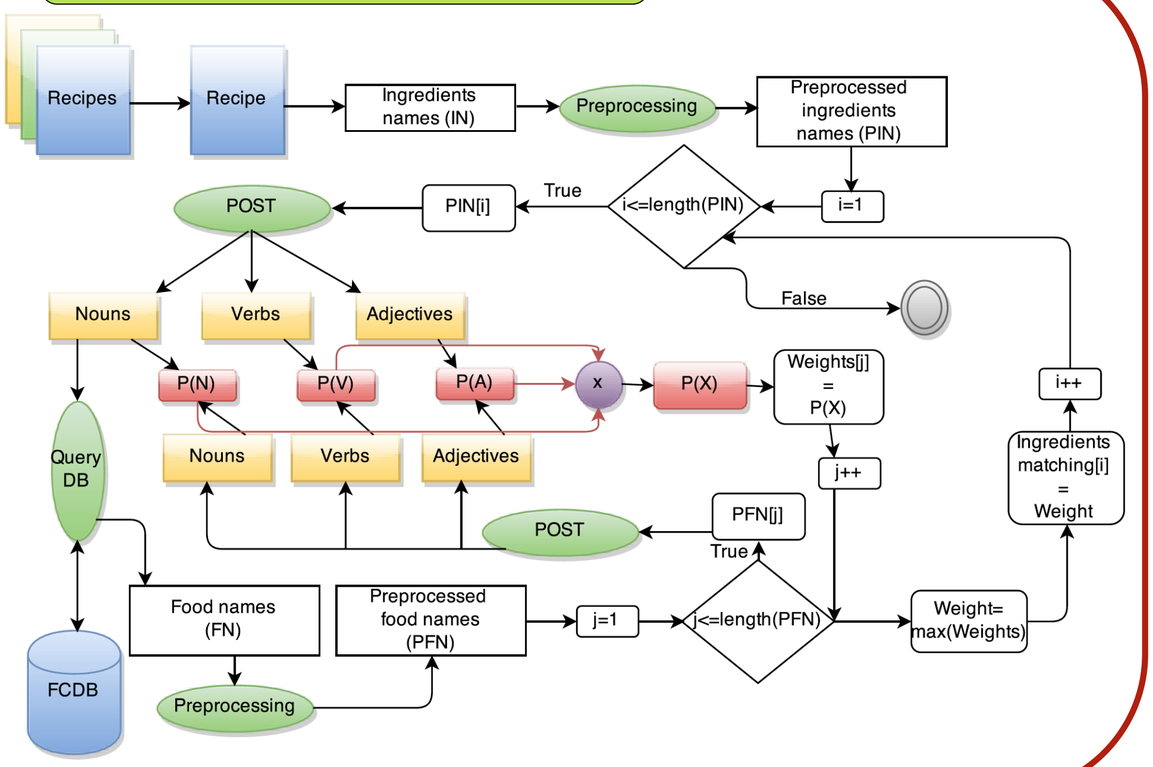
Problem definition

- Ingredients –food composition data matching
- People use human language to write the names of the used ingredients (unstructured form)
- “salt, iodised”, “iodised salt”, “salt-iodised”
- Ingredient synonymy problem
- Preparation method of the ingredient – different nutritional principles

Proposed method

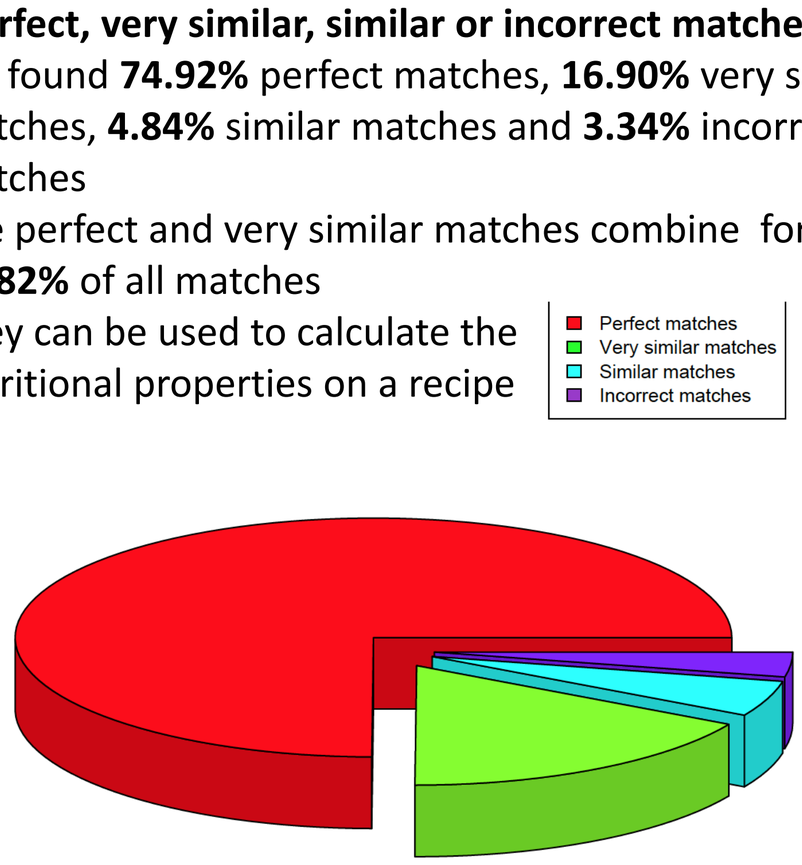
- Probability method with witch we assigned a weight on each matching
- The match with the highest weight is the most relevant one
- POST to capture the information of the names of the ingredients and the names of the food analyses from FCDB
- The weight we assign is the similarity between the ingredient name and the name of the food analysis from the FCDB
- **P(X) = P(N) P(V) P(A)**, where P(N), P(V), and P(A) are the similarities between the sets of nouns, verbs, and adjectives, respectively
- $P(Y) = \frac{J(Y_1,Y_2)+\frac{1}{|Y_1 \cup Y_2|}}{1+\frac{2}{|Y_1 \cup Y_2|}}$, where Yϵ {N, V, A}, and it is a combination of Jaccard index and Laplace probability estimate

Flowchart of the method



Experiment results

- The data we used is a collection of 721 recipes written in English, from which we extracted 1,615 different names of ingredients
- We used 44,033 English names of food analyses from EuroFIR database (http://www.eurofir.org/)
- Each match can be in one of the four categories (**perfect, very similar, similar or incorrect matches**)
- We found **74.92%** perfect matches, **16.90%** very similar matches, **4.84%** similar matches and **3.34%** incorrect matches
- The perfect and very similar matches combine for **91.82%** of all matches
- They can be used to calculate the nutritional properties on a recipe



Conclusion and future work

- New ingredients – food composition data matching method
- The weighted data can be used to help more other models, which can be obtained using machine learning approaches
- Compare recipe nutritional values calculated by our method with the values acquired by chemical analysis of dishes prepared in reference to the recipes

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