Automatic reasoning evaluation in diet management based on an Italian cookbook

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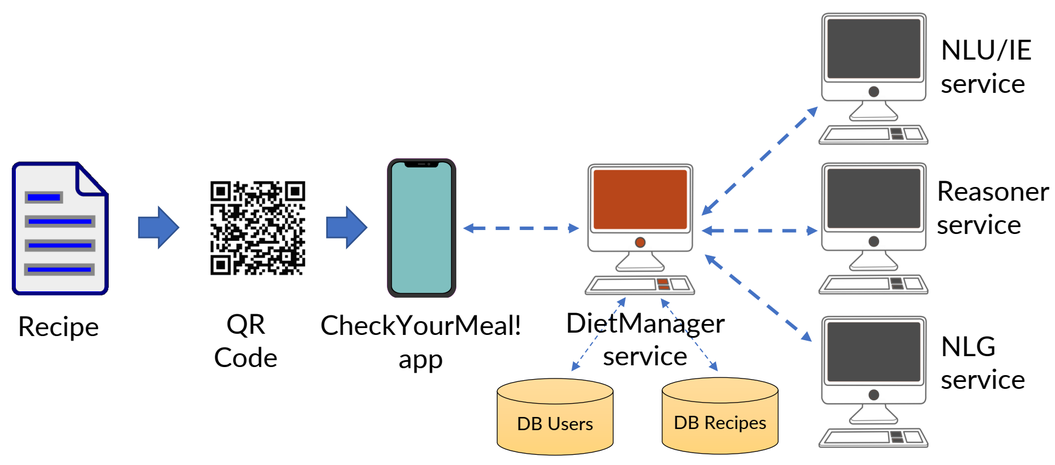
The MADiMAN project

http://di.unito.it/madiman

- Artificial Intelligence for diet management
  - NLP for recipe analysis
  - Automated Reasoning about diet and recipes
  - Persuasive Natural Language Generation

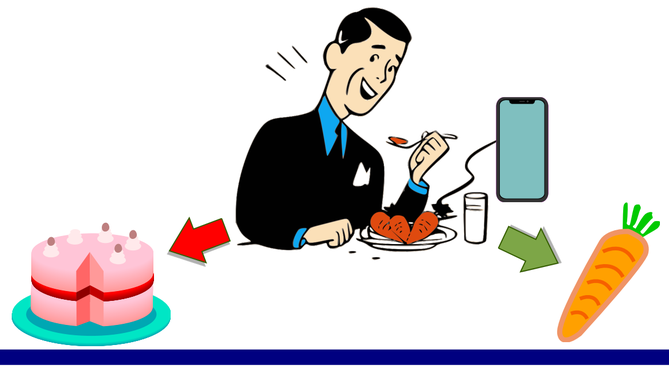


The diet transgression problem

Can a user occasionally fail to stick to a diet and yet reach his/her goals?

What are the consequences of diet transgressions over the next meals?

How can a user compensate such transgressions?



Diets as constraints

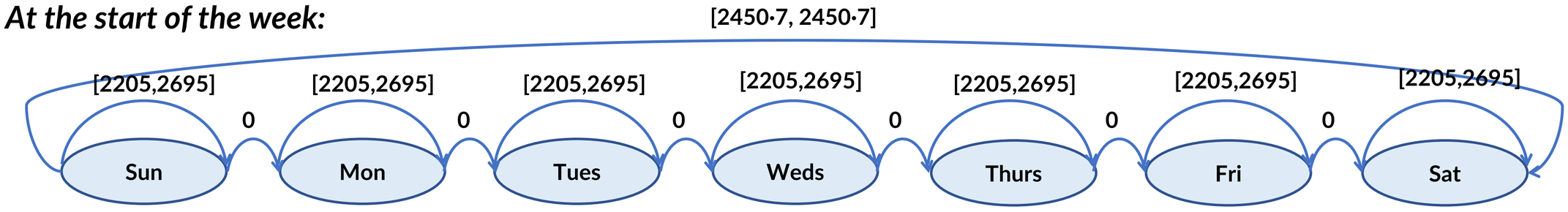
Constraints are bounds on differences on the energy intake.

Constraint propagation checks the consistency and gives the minimum and maximum distance between each pair.

Strict dietary constraints over longest time periods, and less strict over shortest time periods.

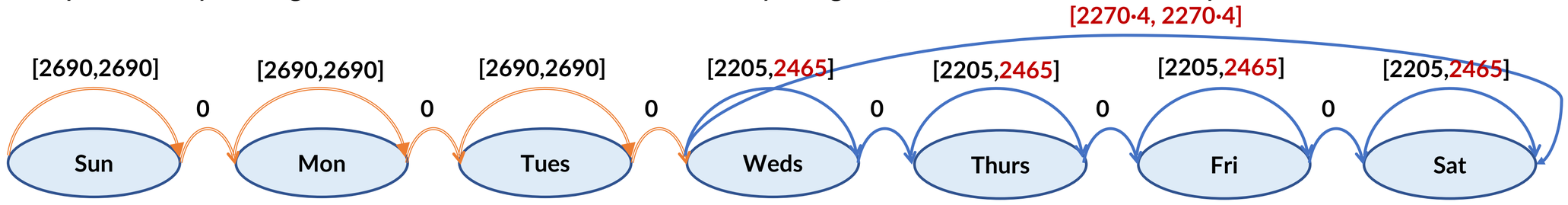
Example: *John, 40 years-old male, 1.80 m, 71.3 kg, sedentary lifestyle. Estimated total energy requirement: 2450 kcal/day. John should eat 2450 kcal/day, but we allow a daily transgression of ±10%*

At the start of the week:



After Tuesday:

John ate 2690 kcal on Sunday, Monday and Tuesday. Constraint propagation discovers that, for reaching the dietary goal, he can compensate by eating 2270·4 kcal, with an allowed daily range of 2205 to 2465 kcal/day



Quantitative Evaluation

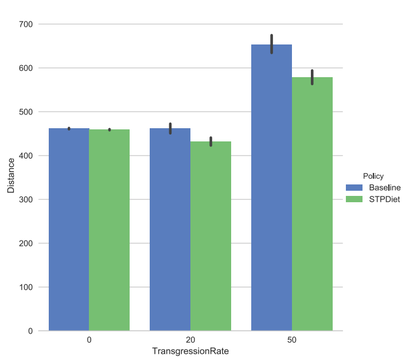
First evaluation in collaboration with *"Città della Salute" Hospital* (3rd largest hospital in Italy). Controlled setting, only mild transgressions are possible

Second evaluation using the recipes in an *Italian cookbook* (http://gedeone-e-coop.it)

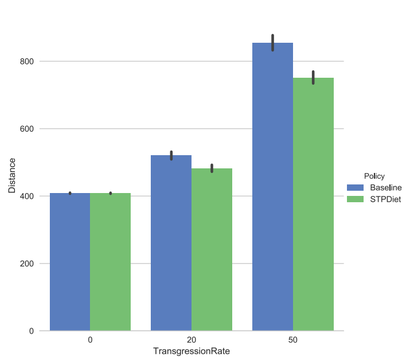
Simulation with three prototypical users which make the "optimal" choice but have different probabilities of transgression.

STPDiet: dynamically adapted diet for compensating transgressions

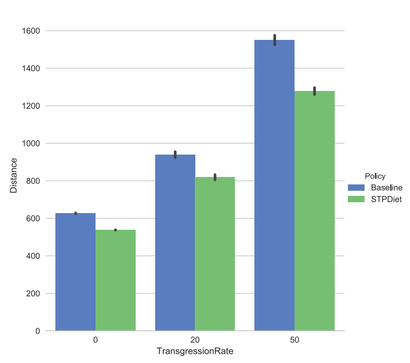
Baseline: Optimal choice considering initial diet



User 1



User 2



User 3

Qualitative Evaluation

Evaluated by a professional dietitian

Pros: clear, informative, customizable

Cons: it currently supports only macronutrients, it lacks user-defined dishes