

Agent-Based Spatial Load Forecasting



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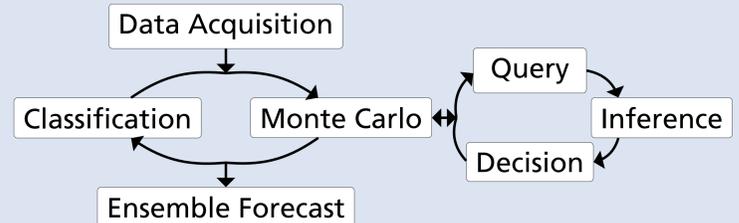
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Spatial Load Forecasting

General Problem: Forecast the aggregate load of all electrical clients in a certain area in a 5 to 10 years time horizon.
Vertical growth: predict the variation of existing customers' load.
Horizontal growth: predict the apparition of new customers and their types.
Main Objective: Obtain an agent-based ensemble forecast for the apparition of new clients and their typical demand in a certain area.

Work-flow

Goal: Horizontal SLF (i.e. forecast the place where new agents will settle).



Agent-based Modelling

Fixed agents: Represent plots in which buildings are not allowed (e.g. parks, roads, shopping centres, hospitals and so on).
Settled agents: Represent buildings, individual households, shops or any kind of existing constructions. They also have a descriptive profile.
New agents: They have a vector containing their preferences on the neighbourhood and an electricity consumption profile, as well as different levels of intelligence for the query phase (e.g. zero, local, evolutionary and God) and for the inference phase (e.g. zero and learning methods).

Experiments

- 1 Compare the results of different combinations of new agents' intelligence with respect to the real urban growth.
- 2 Simulate the spatial load growth given different combinations of new agents' profiles.
- 3 Simulate the impact in the spatial load growth of potential modifications in land policies or the placement of new infrastructures.
- 4 Compare the cost of the diverse electric supply alternatives to new agents (e.g. selection of the most convenient primary and secondary substation).

Quality of Zone α for candidate 1: 10
Quality of Zone α for candidate 2: 5
Quality of Zone α for candidate 3: -5

Quality of Zone β for candidate 1: 5
Quality of Zone β for candidate 2: -5
Quality of Zone β for candidate 3: 10

Quality of Zone γ for candidate 1: 0
Quality of Zone γ for candidate 2: 10
Quality of Zone γ for candidate 3: 5

Candidate 1 infers settled agent A is an instance of family.

Candidate 2 infers settled agent B is an instance of student.

Candidate 3 infers settled agent C is an instance of old.

Query of candidate 1 to settled agent A:

Hospitals: Good
Highways: Bad
Schools: Regular

Query of candidate 1 to fixed agent I:

Parks: Bad
Sport Areas: Good
Public Transport: Improvable

Query of candidate 2 to settled agent B:

Hospitals: Regular
Highways: Good
Schools: Bad

Query of candidate 2 to fixed agent II:

Parks: Good
Sport Areas: Good
Public Transport: Good

Query of candidate 3 to settled agent C:

Hospitals: Very Good
Highways: Very Bad
Schools: Regular

Query of candidate 3 to fixed agent III:

Parks: Bad
Sport Areas: Bad
Public Transport: Very Bad

Preferences of candidate 1:

Type: Family

Hospitals: 3
Highways: -5
Parks: 5
Schools: 4
Sport Areas: 3
Public Transport: 5
Shopping Centers: 4
Family: 4

Preferences of candidate 2:

Type: Rich

Hospitals: 1
Highways: 5
Parks: 5
Schools: -5
Sport Areas: 5
Public Transport: -3
Shopping Centers: 5
Rich: 5
Poor: -5

Preferences of candidate 3:

Type: Old

Hospitals: 5
Highways: -4
Parks: 5
Schools: -5
Public Transport: 5
Shopping Centers: 2

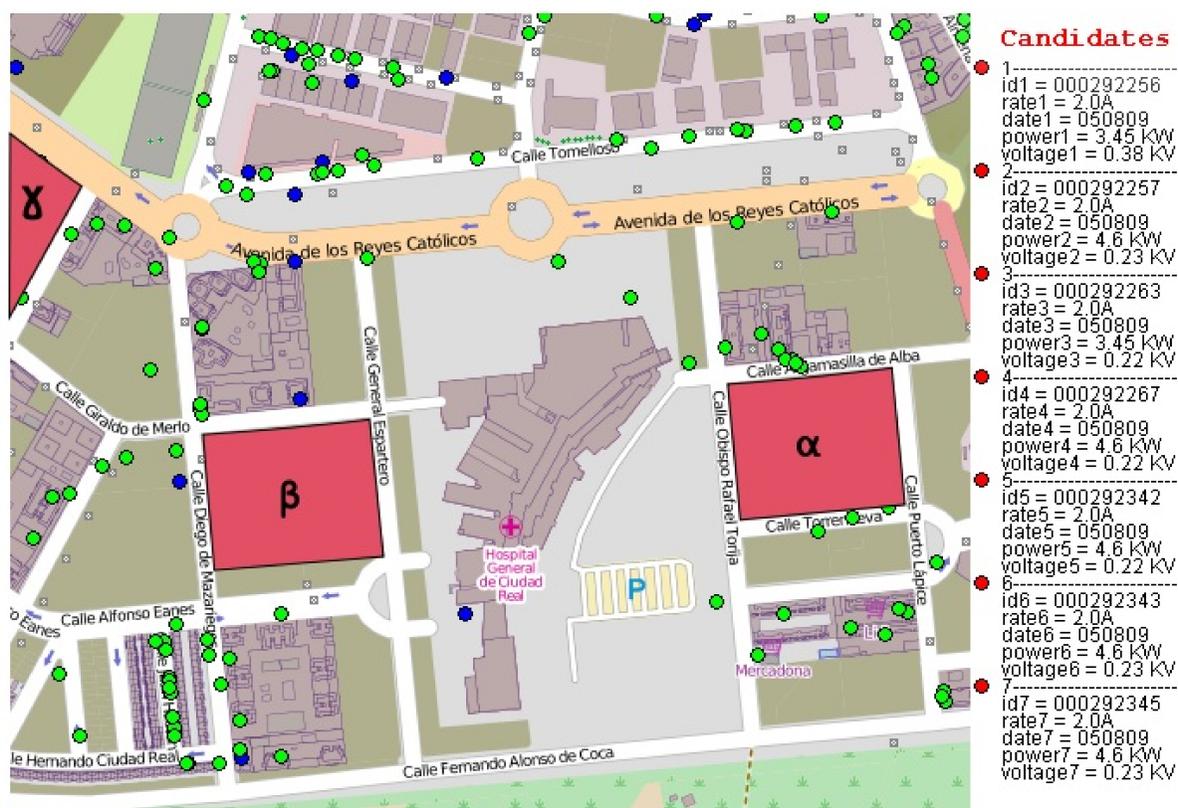


Figure: Mock-up of the application.