**CWI**

Centrum voor Wiskunde en Informatica

Competitive Resource Allocation with software agents in electronic markets

- Use the power of the "market" to efficiently allocate scarce resourses.

  - Example: recommending shops to a customer.

    - Scarce resource is **customer attention**
      (recommend only 5-10 choices out of all shops).

    - Solution: let shops evaluate the value and then
      "bid" for the attention of each separate customer.
      Highest bidders are recommended.

SAKS	GAP
REPLAY	Levi's
Armani Jeans	macys
Banner list 1	Banner list 2
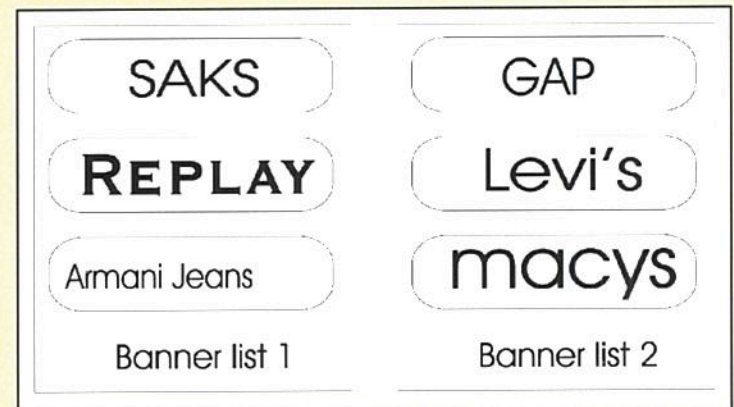
- Economic theory predicts that in a market with rational agents, scarce resources are efficiently allocated.

  - This means that highest bidding *rational* shops are most relevant for a customer.

  - Efficient bidding for each separate customer can only be done automatically
    → **use software agents to represent shops.**

- Software agents have to learn how much to bid for which customers

  - Software agents can use knowledge for bidding strategies, like market research, customer loyalty programs, operational issues (stock etc).

  - Example application domains include *electronic shopping malls, location dependent advertising (mobile applications), personalized health care, web advertisements.*

## CASy: prototype system with smart agents

- Simulation of an electronic shopping mall:
  - Customers each have an abstract profile: "[0.4, 0.3]", shops place bids for each profile
  - from recommended shops, customers choose the shop that best matches their profile
  - shops only manage to sell to some types of customers (profiles).

- With Evolutionary Algorithms, agents learn which customers to attract (their *niche*).
- Learning results in increasing profits
- Learning has also been implemented with Neural Networks.
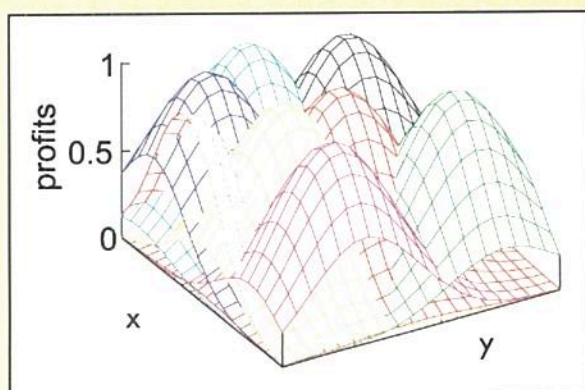
Attractiveness of 8 different shops for customers with a profile [x,y].
Most attractive customers will generate highest profits.
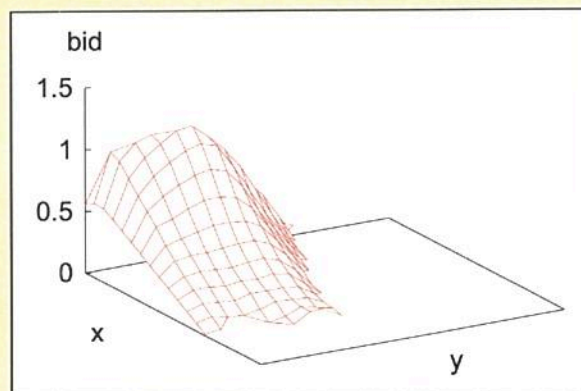
Learned bidding profile for a single shop: only bid for profitable customers.
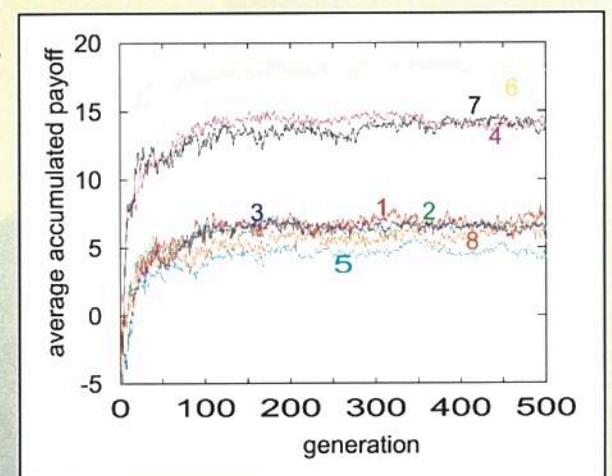
Profits of the shops increase rapidly when learning to target attractive customers.

www.cwi.nl