Ranking the Skyline:
an Application of Preference Learning

Weiwei Cheng (程蔚蔚)
Mathematics and Computer Science
University of Marburg

What is "preference learning"?

What is "preference"?

- Preferences of entities are modeled with preference relations.
- Microeconomics read preferences into choices.

What is "learning"?

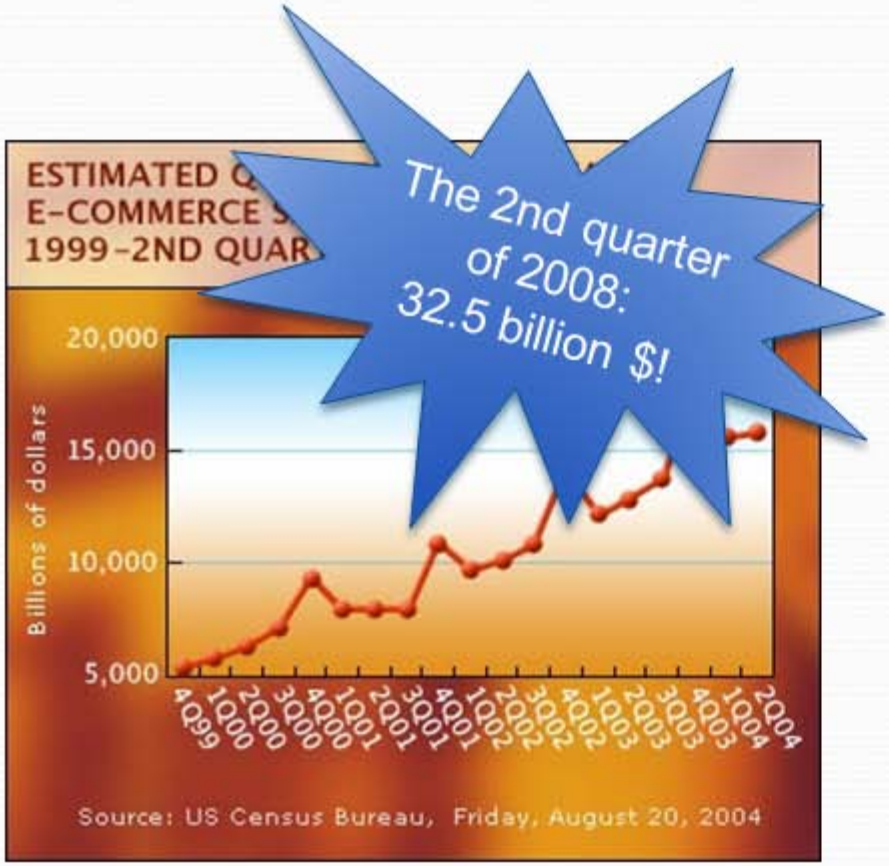
- Machine learning: from data to knowledge.

Why preference learning?

Subjective reasons

- People are not good calculator.
- Human perceptions are fuzzy, uncertain, unreliable ... e.g. change blindness.

Why preference learning?



Objective reasons

- The BOOM of e-services.
- From "Browser" to "Search".

New Challenge

How can we help one attract customers by study their preferences?

On the playground of AI

- Behavior of a rationally acting agent is always driven by an underlying preference model.
- The task of AI: to provide a recommending decision, which reflect the preferences properly.

An example

Tom

Mickey

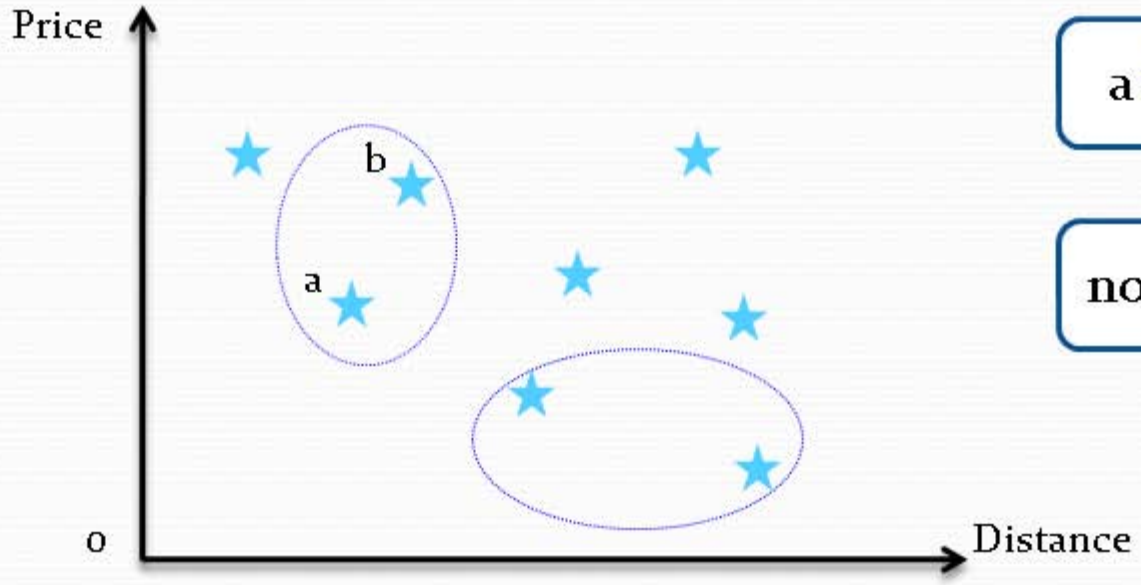
Google News

Jerry

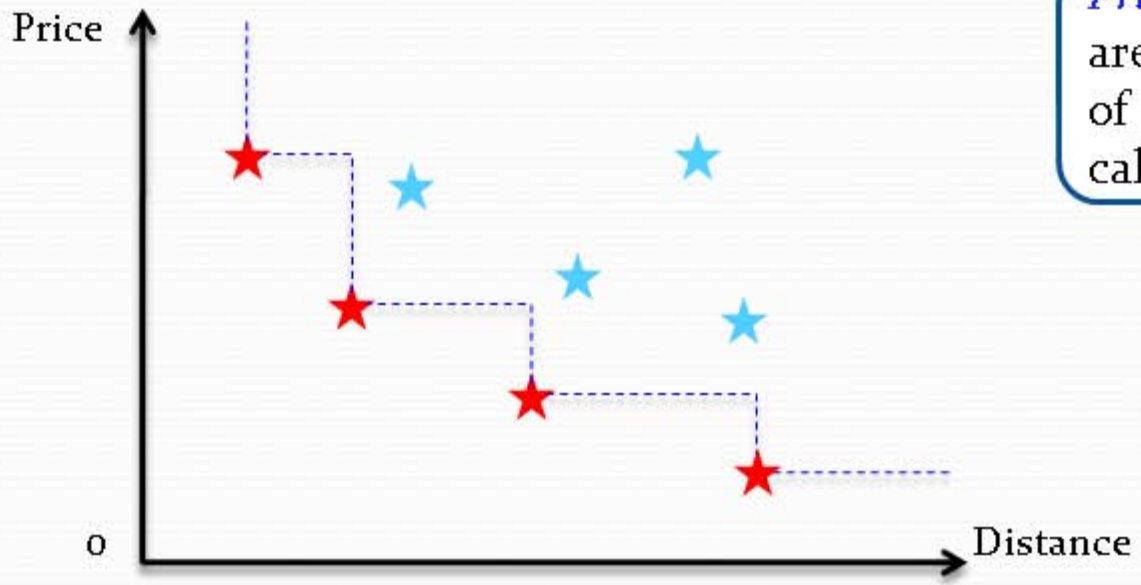
Garfield

1. Collect and aggregate
2. Classify and predict

The skyline query



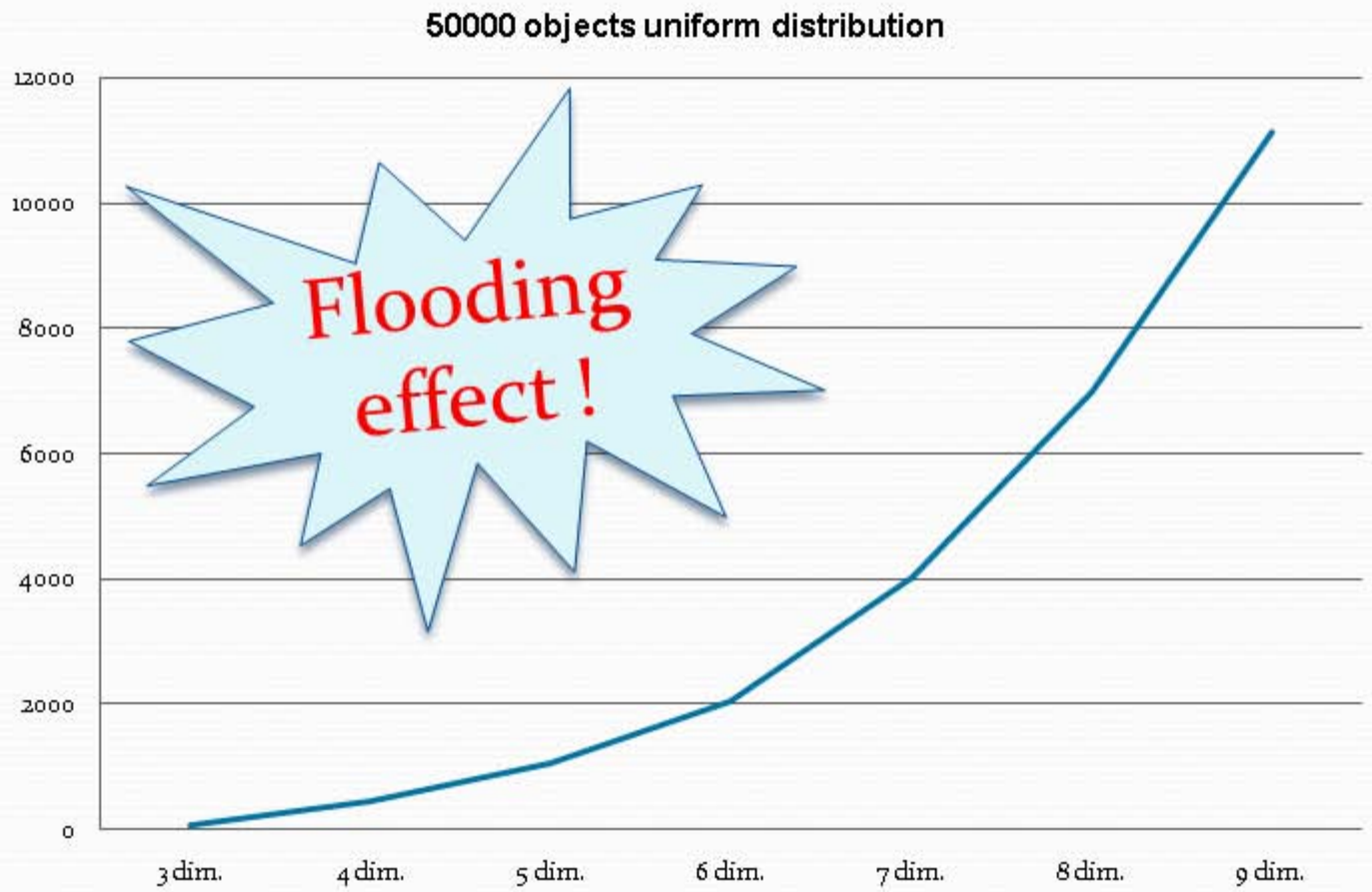
The skyline query



Price & *Distance* are dimensions of the skyline, called criteria.

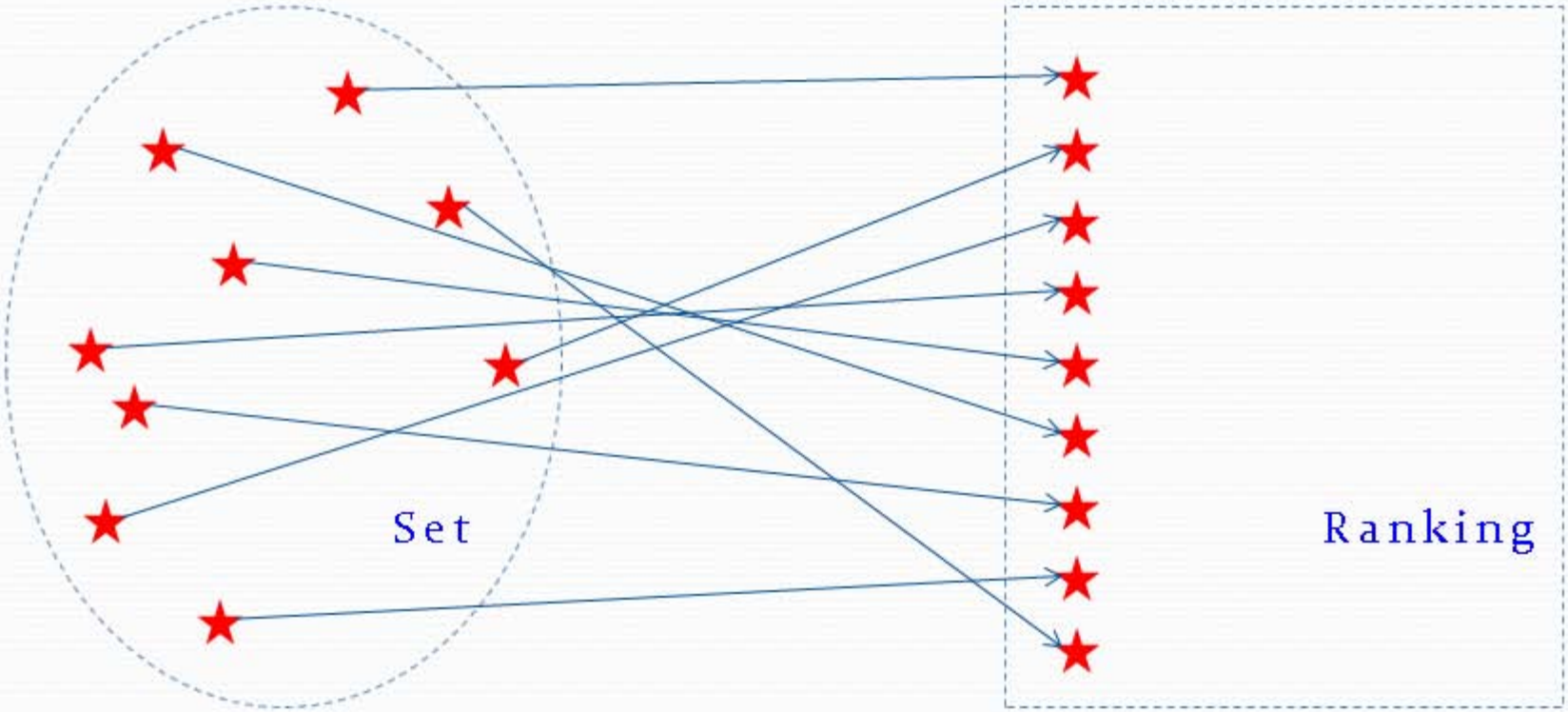
The *skyline* is a set of objects, which are not dominated by any other object w.r.t. all dimensions.

Problem of skyline



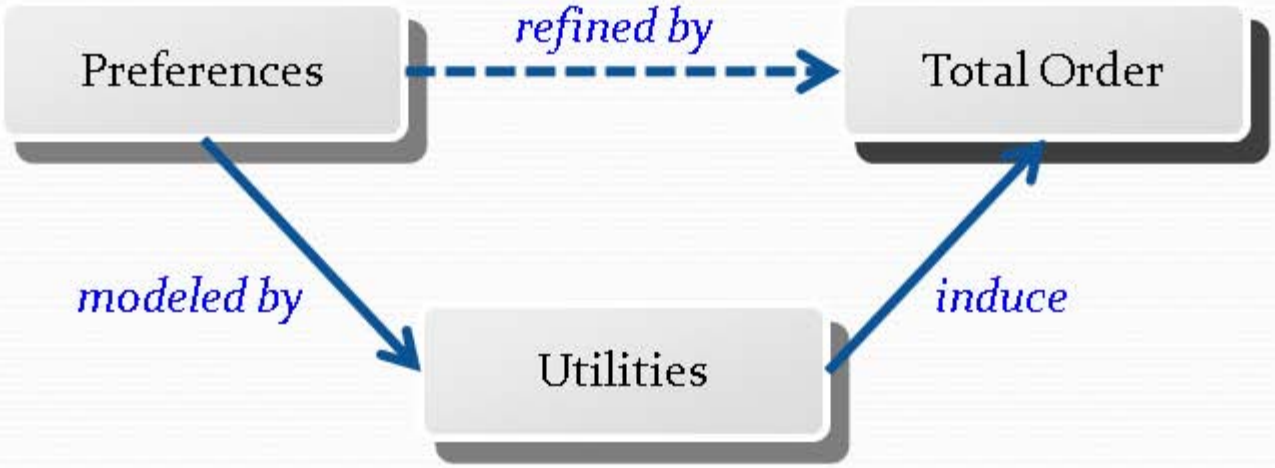
Our idea

A ranking of skyline is more user-friendly.



From preference to r

A binary relation that is antisymmetric, transitive, and total.



A utility function $U(\bullet)$ assigns a real utility degree to each object on skyline.
If $U(a)<U(b)$, user strictly prefers object b to a.

Take-home message

- What is preference learning.
- Why are we doing this.
- Examples of preference learning.
- Our idea on ranking the skyline.

Thanks for your attention!

www.chengweiwei.com