

# Virtual Ratings: A New Information Source for Feedback-based Systems in E-commerce

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- ▶ Collaborative Filtering (CF)
  - ▶ Learn user's preference
  - ▶ Probe **like-minded** users
  - ▶ Make **recommendations**

	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>
A	3	4	5	?	?
B		4	4	5	3
C	5	5	3	4	

The table illustrates a user-item rating matrix. The columns represent items P<sub>1</sub> through P<sub>5</sub>, and the rows represent users A, B, and C. The ratings are as follows: User A rates P<sub>1</sub> as 3, P<sub>2</sub> as 4, P<sub>3</sub> as 5, P<sub>4</sub> as ?, and P<sub>5</sub> as ?. User B rates P<sub>2</sub> as 4, P<sub>3</sub> as 4, P<sub>4</sub> as 5, and P<sub>5</sub> as 3. User C rates P<sub>1</sub> as 5, P<sub>2</sub> as 5, P<sub>3</sub> as 3, and P<sub>4</sub> as 4. A red oval highlights the ratings for user A across all items. A purple oval highlights the ratings for user B across items P<sub>2</sub>, P<sub>3</sub>, and P<sub>4</sub>. Green brackets group the ratings for user A in columns P<sub>4</sub> and P<sub>5</sub>, and for user B in columns P<sub>4</sub> and P<sub>5</sub>.

Table 1: User-item rating matrix

- ▶ Research problems
  - ▶ Cold Start
  - ▶ Data Sparsity

	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>	P <sub>7</sub>	P <sub>8</sub>	P <sub>9</sub>	P <sub>10</sub>
A	3	<del>1</del>	<del>2</del>	?	?	?	?	3	?	?
B	?	4	4	5	3	?	?	?	?	1
C	5	5	3	4	?	?	2	?	?	?

Table 2: User-item rating matrix

- ▶ Solutions so far
  - ▶ Incorporating additional information
    - ▶ Friendship, membership, trust
    - ▶ Extra data may not available
  - ▶ Original data + ‘virtual ratings’
    - ▶ Imputation, matrix factorization
    - ▶ Hard to explain
  - ▶ Original data only
    - ▶ Similarity measures
    - ▶ Limited improvement

- ▶ Virtual Environments (VEs)
  - ▶ Emerging user interface
    - ▶ Second Life, Twinity
    - ▶ Platforms for E-commerce
  - ▶ Advantages
    - ▶ Richness in media
    - ▶ Richness in interactions
    - ▶ <http://youtu.be/kp1XI5G022M>
  - ▶ Research in 3D E-commerce
    - ▶ Infancy phase



- ▶ **Traditional RecSys**
  - ▶ Carenini et al. [1]
    - ▶ a set of elicitation techniques
    - ▶ conversational and collaborative interaction model
  - ▶ McNee et al. [2]
    - ▶ Let systems or users choose items
  - ▶ Nguyen and Ricci [3]
    - ▶ incorporate long- and short-term preference
  - ▶ Dong et al. [4]
    - ▶ A browser plugin for review recommendation

## ▶ RecSys in VEs

### ▶ Literature

- ▶ New recommender agents needed [5]
- ▶ Little work show up
  - ▶ Usable info for preference [6]
  - ▶ Location recommendation [7]
  - ▶ Virtual furniture recommender [8]

### ▶ Shortcomings

- ▶ No use of features of VEs
- ▶ **Virtual** products only
- ▶ **No evaluations** provided



## ▶ Ratings

### ▶ Virtual ratings

- ▶ Users' assessment or judgment of preference of products based on virtual product experience
- ▶ Interactive in nature
- ▶ Presence generated through a medium
- ▶ No need to purchase

### ▶ Physical ratings

- ▶ real-world product experience
- ▶ Post-purchase ratings

- ▶ Conceptual model
  - ▶ Literature from several disciplines

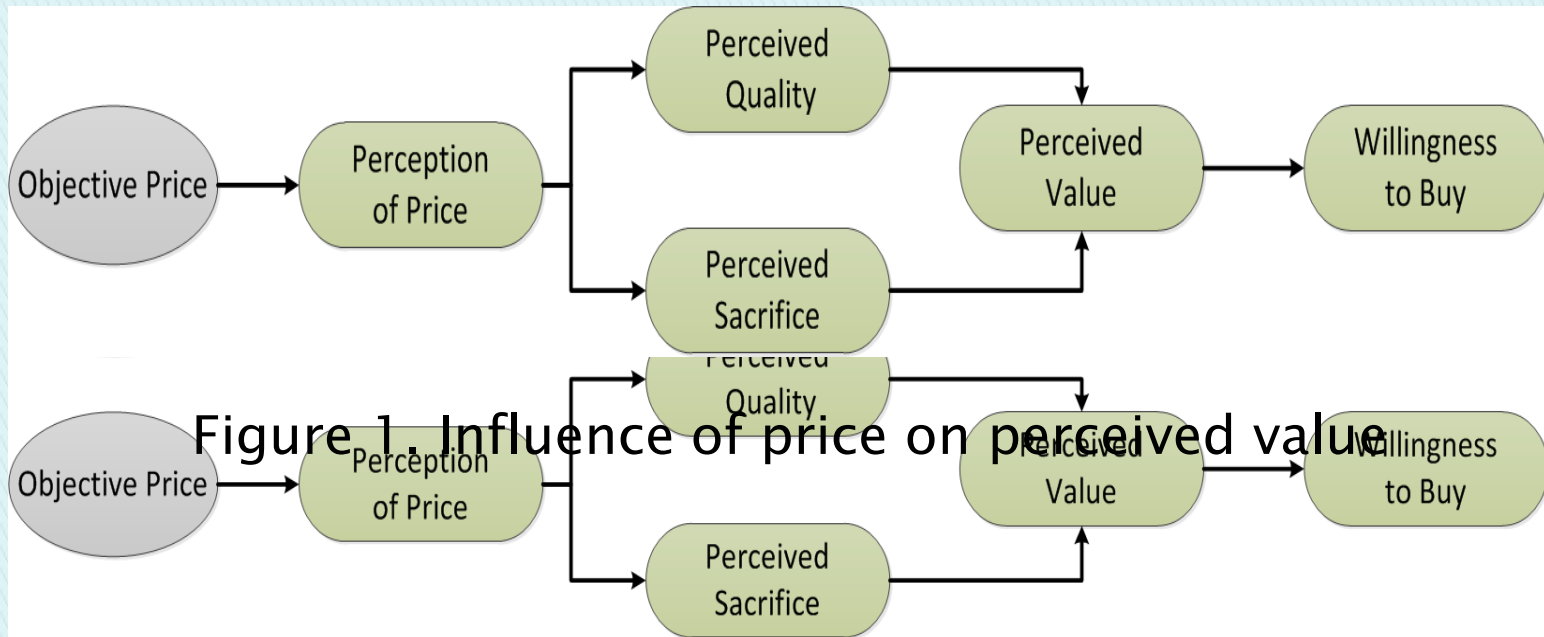


Figure 2. Influence of brand and store on perceived value

- ▶ Hypotheses
- ▶ **H1**: Presence has significantly positive influence on the perceptions of both intrinsic and extrinsic attributes
- ▶ **H2**: Users depend more on extrinsic attributes than intrinsic attributes to evaluate the **product quality** in WS, whereas users depend more on intrinsic attributes than extrinsic attributes to evaluate the product quality in VE.

- ▶ Hypotheses
- ▶ **H3**: Perceived quality has significantly positive influence on virtual ratings and **perceived cost** will also positively influence virtual ratings if the price is rational or acceptable.
- ▶ **H4**: Users are more **confident** in giving virtual ratings in VE than in WS



94% of respondents would recommend this to a friend.

## PROS

Soft (15)

## CONS

Thin Material (5)

## BEST USES

Casual Wear (16)

## ▶ Experiments

### ▶ User study

- ▶ Introduction: video (5 mins); warm-up (5 mins)
- ▶ Users randomly separated into 2 groups
  - ▶ From WS to VE; or inverse
- ▶ Users:
  - ▶ 30 subjects, students and staff
  - ▶ Shop online once in a while
  - ▶ 50% never used VEs before
- ▶ Process:
  - ▶ Rate 8 tee-shirts and then environment

## ▶ Indications

### ▶ Data sparsity

- ▶ Virtual ratings prior to purchase
- ▶ Brows more than what purchased

### ▶ Cold Start

- ▶ Model preference based on
  - ▶ physical ratings
  - ▶ virtual ratings

### ▶ User interface

- ▶ High presence leads to accurate virtual ratings

- ▶ Limitations
  - ▶ Conceptual model
    - ▶ Based on product attrs
    - ▶ No consideration of consumer-oriented attrs
  - ▶ Experiments
    - ▶ One kind of products used
    - ▶ Some attrs not available
    - ▶ Subjects: students or staff
    - ▶ Sample size modest



- ▶ **Virtual ratings**
  - ▶ Conceptual model
  - ▶ Experiments on WS and VE
  - ▶ Indications
- ▶ **Future work**
  - ▶ Develop specific algorithm
  - ▶ More benefits of virtual ratings:
    - ▶ Diversity, serendipity

**Thank You!**  
**&**  
**Questions?**

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