

# Ratings in, rankings out. Keep it simple, they said. But we need more than that.



4th Workshop on Recommendation in Complex Environments (ComplexRec 2020)



# We need the 'right' information, at the 'right' time, in the 'right' place, in the 'right' way, to the 'right' person.

#### Gerhard Fischer (2012)—and many others

Gerhard Fischer (2012). Context-aware systems: the "right" information, at the "right" time, in the "right" place, in the "right" way, to the "right" person. In Proceedings of the International Working Conference on Advanced Visual Interfaces (AVI '12), pp 287–294. DOI: 10.1145/2254556.2254611











# Input

#### **Explicit feedback**





#### Implicit feedback





#### Challenges: Relation of explicit and implicit feedback

- Strength of a implicit feedback
- Stronger or weaker than explicit rating?

Research on good predictors from implicit to explicit expression



#### Challenges: Which feedback instrument should we use?

- Domain-specific differences
  - Suitability: Fit of fine-granularity, burden to rate
  - Establishment does not necessarily mean good/best fit
- Individual differences
  - Preference how to express feedback
  - Preference/ability to express preference on a fine-granular scale
  - Individually perceived burden to rate
- Context: "What should we use? It depends."

 $\star\star\star\star\star\star\star\star\star\star\star$ 



# The relevance of context



Tina Turner-Simply the best (lyric video)

Utrecht University

#### One size does not fit all.

#### depends on the person

#### depends on the situation

An ideal intelligent system is aware of its context and adapts to it.

> https://greatergood.berkeley.edu/images/ uploads/meditating-headphones-small.jpg



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https://cdn-images-1.medium.com/ma

ne9Fr33kmEjl2pGw.jpg

#### **Recommendation as a matrix completion problem**

user x item  $\rightarrow$  rating





#### **Recommendation as a matrix completion problem**

user x item x context  $\rightarrow$  rating





# Context is any information that can be used to characterize the situation of an entity.

Anind K. Dey (2001)

Anind K. Dey (2001). Understanding and using context. Personal and Ubiquitous Computing, 5(1), pp 4-7.



The typical approach to context in recommender systems research

user x item x context  $\rightarrow$  rating

Everything that is **neither** the user (id) **nor** the item (id) is context.



But what **is** context? What context is **relevant**?

# e.g., potentially relevant context elements for music recommendation





### Context-aware computing

#### **Context is a huge and heterogenous space!**

- analysis of 36 context modes
- in 6 years of research on context-aware computing:
- total of 10,498 context elements
  (3,741 unique context elements)

		domain-specific								
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	) (.	target service								
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**Christine Bauer** & Alexander Novotny (2017). A consolidated view of context for intelligent systems. Journal of Ambient Intelligence and Smart Environments, 9(4), pp 377-393. DOI: 10.3233/ais-170445



#### What we use in recommender systems is very limited.

. . .

examples from music recommender research





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#### Let's meet the complexity of input!

We could open up new space if we considered the various facets of context for recommendations.

#### **Context-awareness** may help to:

- increase user satisfaction
- identify problems (evaluation)
- mitigate those problems (system design)







# Output

#### Rankings



What is the implication of such a cut-of?



#### What would you choose in this ranking presentation?





#### Bundles, complementary goods, sequences





#### **Ranking of bundles**







# Pervasive advertising

Contextual advertising Editorial advertising

. . .

#### It is not all about the person—the situation matters.

#### depends on the person

#### depends on the situation







#### Personalization and situationalization

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**Christine Bauer** & Peter Lasinger (2014). Adaptation strategies to increase advertisement effectiveness in digital media. Management Review Quarterly, 64(2), pp 101-124. DOI: 10.1007/s11301-014-0101-0

Peter Lasinger & **Christine Bauer** (2013). Situationalization: the new road to adaptive digital-out-of-home advertising. Proceedings of the IADIS International Conference e-Society (ES 2013). Lisbon, Portugal, 13-16 March, pp 162-169.



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It's simple, isn't it?

