e-Coaching the Elderly
Recommender Systems in Health

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Interaction of Humans and Algorithms

Pervasiveness of AI

- Availability of Big Data
- Increase of Computing Power (esp. GPUs)
- Novel Algorithms – Machine Learning, Deep Learning, Recommendation
- Novel Frameworks – increase in accessibility

- Artificial Intelligence permeates all fields of application
  - Economics, Engineering, Bio-Technology, Pharmacology, etc.

- Application in health is very diverse
  - Utilization in medicine and research
  - Utilization in therapy

- Recommender Systems in Health
  - Finding user preferences and adapting content – “Personalization”
Recommender systems are everywhere

Applications and domains

- E-Commerce, tourism, information retrieval, e-Learning, people recommendation, group recommendation, search, media and communications
Recommender Systems in Health

Two target user groups

• Doctors
  – Decision support for diagnosis, adjusting therapy, finding health information

• Patients
  – Adjusting the therapy to the individual needs of the patients
    ▪ Recommending healthy foods, sports alternatives, behavior nudging
  – Feedback from users is utilized by all users
    ▪ If I like recommendations A, B, C I might also like D, because other users did…

• Different Recommendation Algorithms
  – Social Recommendation, Trust-based, Content-based, collaborative filtering, etc.

• Benefit of health recommendation systems
  – Everyone benefits from all data
  – …or do they?
Challenges

Problems with health recommender systems

• Privacy Concerns
  – Different perspectives on privacy from different users
    ▪ Contributors and Consumers?
    ▪ Who uses my data for what purpose?
    ▪ Will I still agree with my data being stored in the algorithm in 10 years?
    ▪ Distributed Recommendation Systems, homomorphic encryption

• Malicious Attacks
  – Forging preferences by utilization of fake users
  – Uncovering user data by preference elicitation

• Responsibility?
  – The algorithm designer? The other users? The user?
  – Human-in-the-loop?

• Filter Bubbles
  – Will I get similar therapy as others, just because of what I have previously used?
Ageing

User diversity increases with

• Age amplifies user differences
  – Perceptual performance, prior experience, attitudes

• Mental models of underlying technology are often misleading
  – No conceptual model of digital data storage, use, utilization
  – Misperceptions of artificial intelligence

• Different concepts of ageing
  – Dignified ageing
  – Technology as means of staying young
  – Technology-dependence amplified the loss of independence

• Tools must be context-aware, user centered design, configurable, personalized
• Motives and Barriers – Inclusive, affordable, and social