Markets, Algorithms, Incentives, and Networks

WS 2022/2023

Overview Meeting (Vorbesprechung)

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DSS
Decision Sciences & Systems

Purpose of Today's Meeting

- Let you know more about the **format of the seminar**
- Introduce you to the **topics and material**
- Tell you about the **application process**

Suitability / Requirements

- This is a **bachelor's level** seminar
- ... that is open for master students as well.
- Suitable for students from
  - Computer science
  - Mathematics
  - Business Administration
  - ...
- Requirements
  - no formal requirements
  - interest in reasoning with mathematical rigor

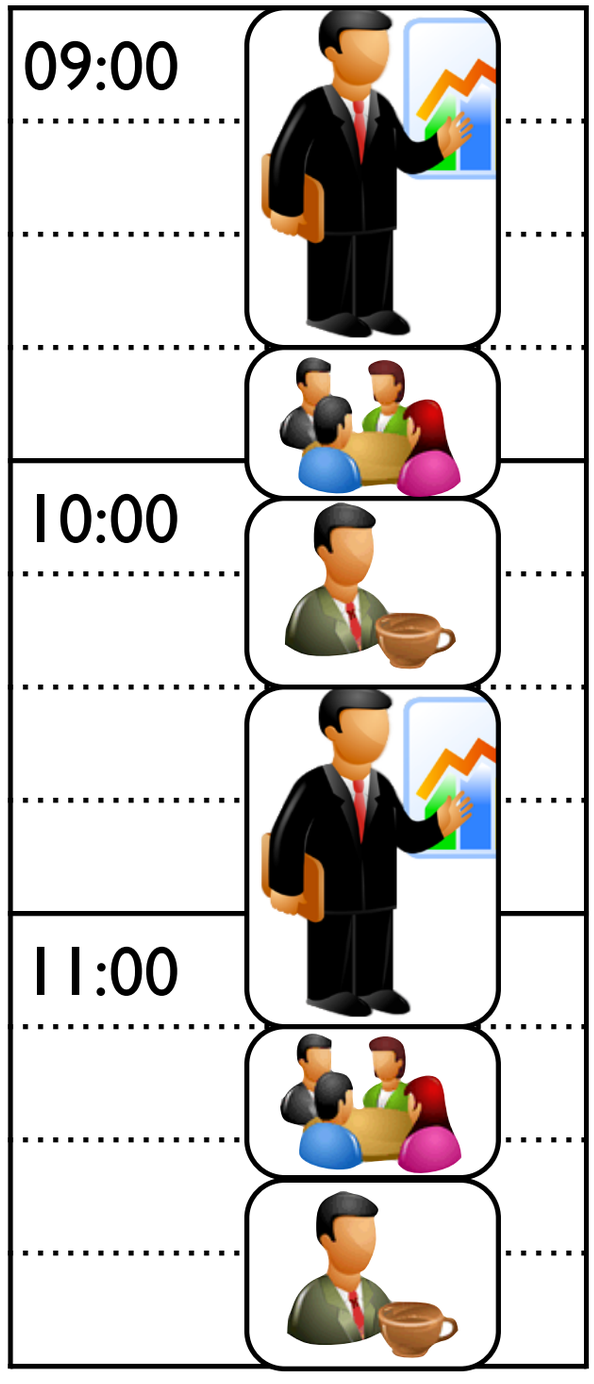
Tentative Dates

Date	Time	Content	Room
July, 5 ✓	14.00 - 15.00	Overview	01.10.033

Date	Time	Content	Room
October, 20	14.00 - 16.00	Kick off	01.10.033
November	09.00 - 16.30	Presentations	01.10.033
December	09.00 - 16.30	Presentations	01.10.033
December	09.00 - 16.30	Presentations	01.10.033

Rough Schedule

- Two morning presentations
- Two afternoon presentations
- Presentation:
  - Talk (at least 30 up to 45 min)
  - Feedback & Discussions (20 to 25 min)
  - Break (15 min)



...

In order to pass you need to …

- As a regular attendant
  - attend **all meetings**
  - read the **handouts** of your peers
  - prepare **questions**
  - participate in **discussions**

- As a speaker
  - prepare a **handout** for your talk (~4 pages)
  - give a **good talk**

- As a session chair
  - **consolidate** and **structure** questions (if necessary)
  - **introduce** the speaker
  - **moderate** the discussion

Content

- Based on the books *Economics and Computation* by David C. Parkes and Sven Seuken and the *Handbook of Computational Social Choice*

- "*[…] motivated by the consideration of economic incentives within computational systems and by computational considerations in economic systems.*"

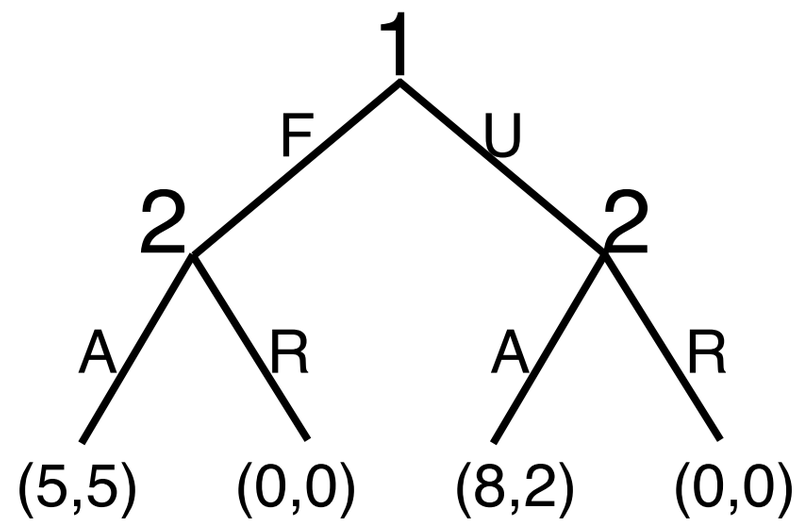
- 1) Games (Chapters 2, 4)
  2) Auctions (Chapters 6, 7, 8, 11)
  3) Markets (Chapters 12, H11, H12, H13)
  4) Welfare (Chapters 15, 27)
  5) Information (Chapters H18, 29)
  6) Networks (Chapters 24, 25)

Games

P_1 \ P_2	C	D
C	(3,3)	(1,4)
D	(4,1)	(2,2)

- Players have various actions at their disposal
- Every possible outcome is assigned a utility value
- Goal: Examine strategic behavior

- **Chapters**
  2) Simultaneous-Move Games
  4) Sequential-Move Games



Auctions

- Different flavors, different solutions:
  - Single-item: English Auction, Dutch Auction, First Price, Second Price
  - Combinatorial Auctions
- Issues include the following:
  - Which protocol is better for the auctioneer?
  - Lying, cheating and strategic issues in auctions

- **Chapters**

  6) Auction Design
  7) Mechanism Design
  9) Revenue Optimal Auctions
  11) Combinatorial Auctions

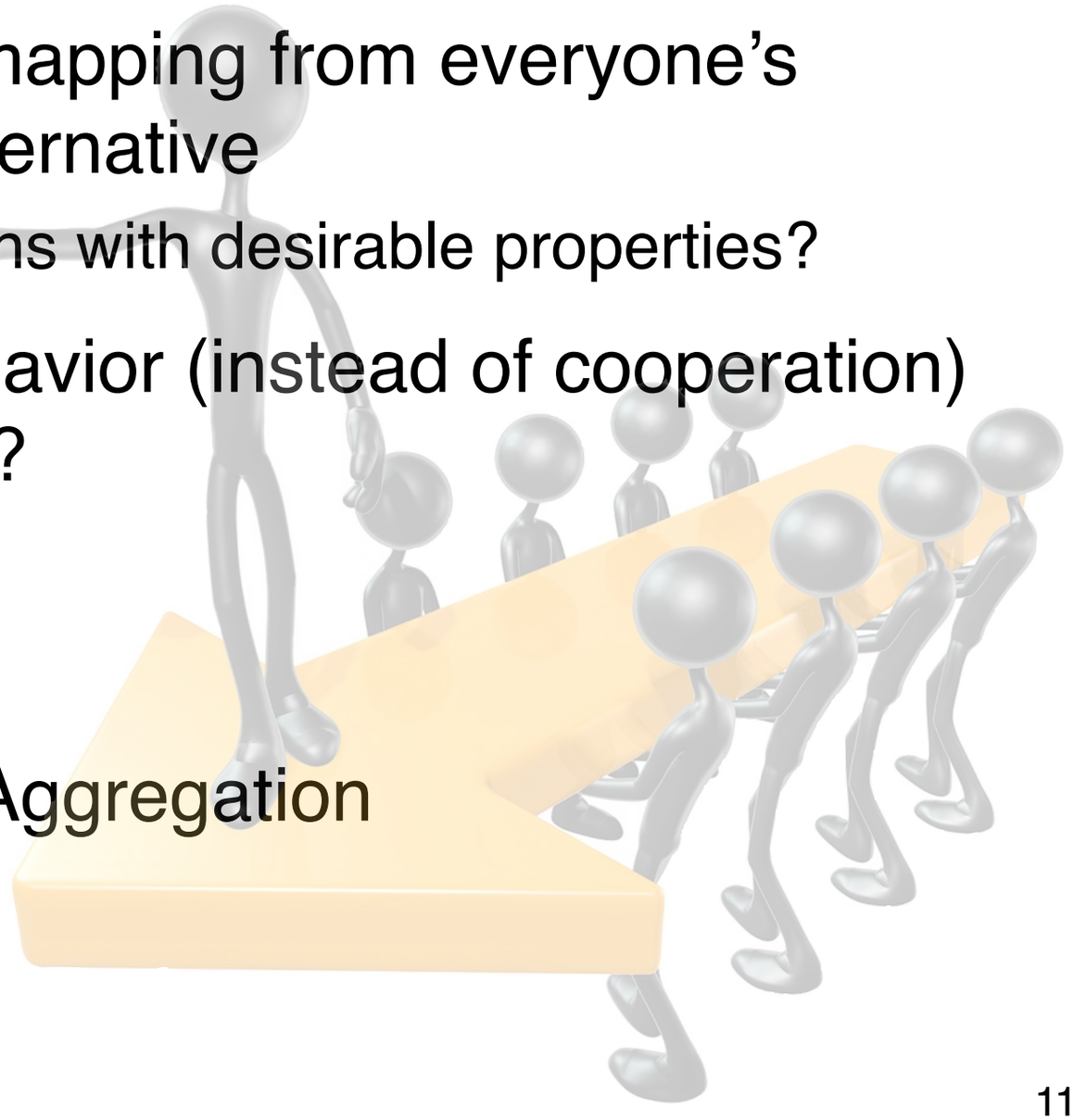
Markets

- A market contains different groups of agents (e.g. buyers-sellers, issuers-clients, men-women, students-houses, …)
- Goal: Match agents subject to additional considerations:
  - Maximize revenue
  - Ensure satisfaction/stability
  - Maximize trust

- **Chapters**
  12) Matching Markets
  H11) - H13) Fair Allocation

Welfare

- Agents have preferences over alternatives
- A social choice function is a mapping from everyone's preferences to a particular alternative
  - Goal: How to pick such functions with desirable properties?
- What effects does selfish behavior (instead of cooperation) have on the society's welfare?



- **Chapters**
  15) Social Choice and Rank Aggregation
  26) Price of Anarchy

Information

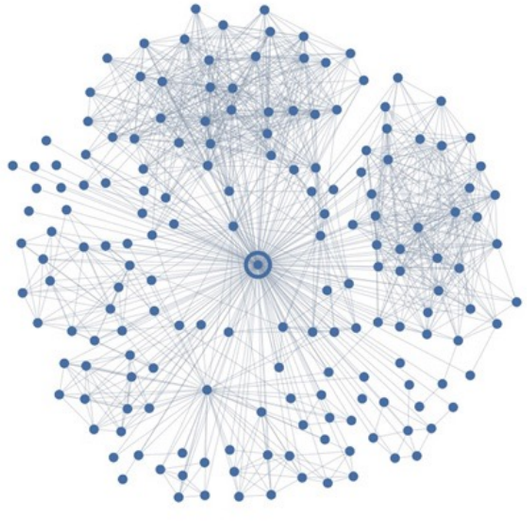
- Designing a reward scheme that incentivizes people to provide high quality information
  - Assess the accuracy of Google translate and measure the quality of the assessment
- Releasing useful information without causing individual harm
  - Gain societal value from data, while learning little about an individual

- **Chapters**
  H18) Page Rank
  29) Privacy

Networks

- Understand networks from the perspective of economics and computer science
- Analyze structural regularities in real-world networks
  - Small-world property
  - High edge-clustering
- Information propagation over networks

- **Chapters**
  24) Network-Formation Games
  25) Games on Networks



Where to get the EC book?

- **Caution:** please send us a message to receive the guest key for the course

https://www.moodle.tum.de/course/view.php?id=80184

- Do not distribute the book, only for use in this seminar!

Registration

- Send an email to chris.dong@tum.de with:
  - subject: ‘[MAIN] Application <your name>’,
  - background: program, semester, relevant lectures you had, your three most preferred topics (chapters) (1. ..., 2. ..., 3. …),
  - a short summary of **each** of your selected topics (up to ~200 words in total).
- **Deadline:** Thursday, July 14, 23:59 pm
- Use the respective matching systems to rank the seminar
- Seminar homepage

See you in October!