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Fairness in algorithms

Secure multiparty computation

Peer assessment

Active learning

Preference elicitation

Information retrieval

Distributed constraint optimization

Scheduling

Group decision-making

Neural networks

Privacy-accuracy tradeoff

Consensus under a deadline

Computational social choice

Multi-agent systems

Mechanism design

Label ranking

Primacy-recency bias

Iterative voting

Course allocation

Strategic manipulation

Adversarial examples

Learning to rank

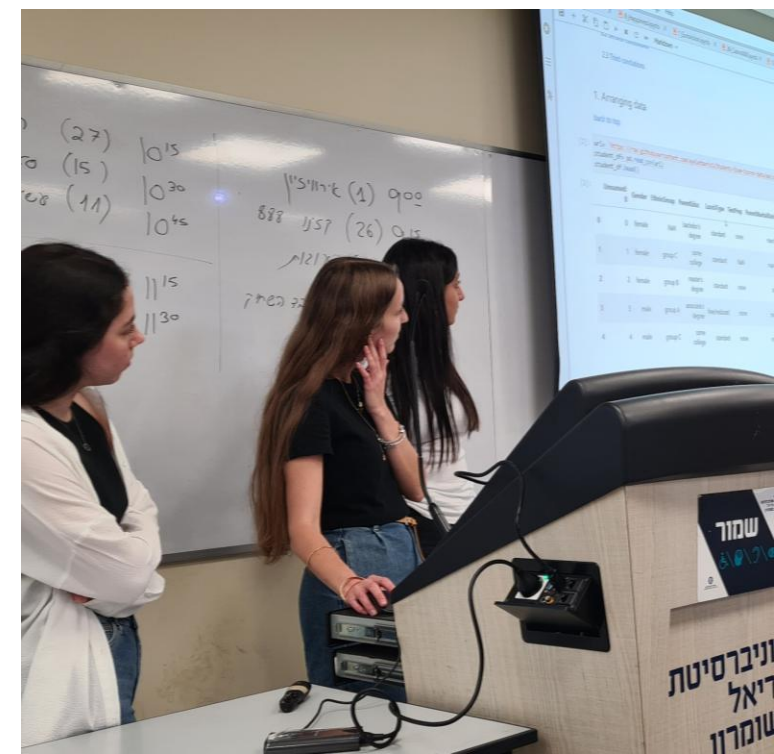
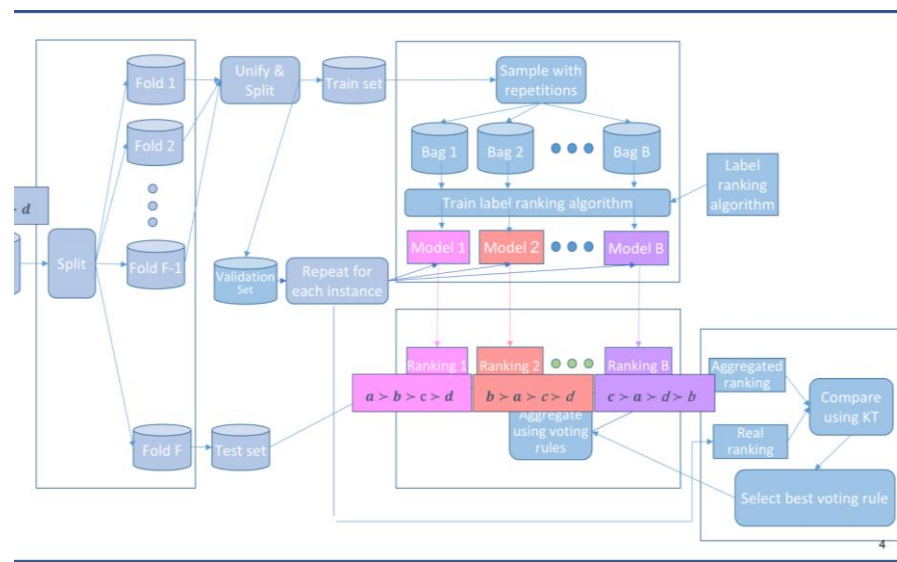
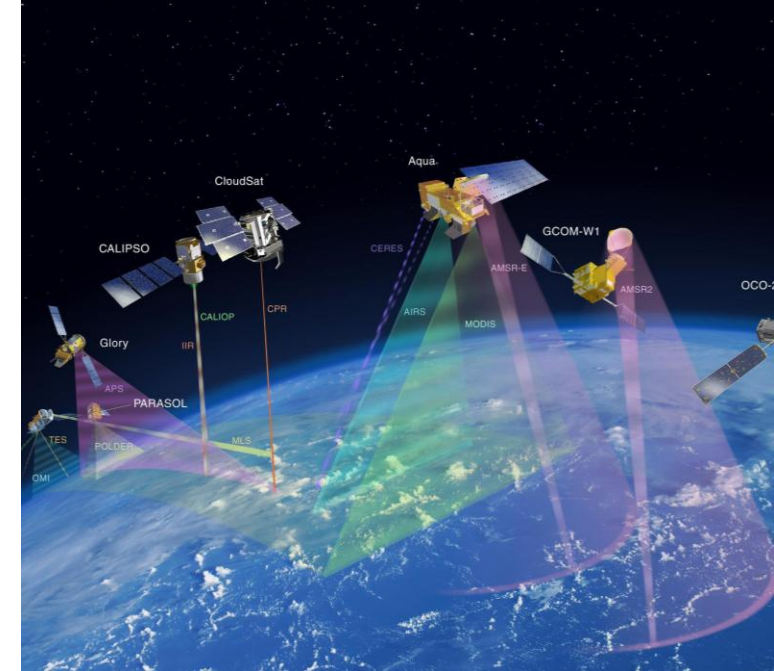
Social networks

Resource allocation

Assessment fatigue

Educational technology

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## Elicitation isn't easy

- Communication Overload
- Cognitive overload
- Bias
- Fatigue
- People vote strategically
- People manipulate





## Aggregation isn't easy

- Unanimity
- Independence of Irrelevant Alternatives
- Unrestricted domain
- Avoid misery
- Avoid dictatorship
- Avoid ties
- Be fair



							
1 <sup>st</sup>							
2 <sup>nd</sup>							
3 <sup>rd</sup>							
4 <sup>th</sup>							









Simple majority vote:



							
1 <sup>st</sup>							
2 <sup>nd</sup>							
3 <sup>rd</sup>							
4 <sup>th</sup>							

Points according to ranking:



							
1 <sup>st</sup>							
2 <sup>nd</sup>							
3 <sup>rd</sup>							
4 <sup>th</sup>							

But most people prefer





							
1 <sup>st</sup>							
2 <sup>nd</sup>							
3 <sup>rd</sup>							
4 <sup>th</sup>							

But most people prefer







## Design algorithms that turn opinions into:

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- Fair decisions
- Efficient decisions
- Non-manipulable decisions
- Manipulable decisions



# Peer assessment

R2R

Logout

Today's Teams:

Team 1: Eurovision contest

Enter your feedback

Team 4: E-commerce products

Completed

Team 6: Unicorn companies analysis

Enter your feedback

Team 7: Video games sales

Enter your feedback

Team 10: Product opinions & news

Enter your feedback

R2R

Logout

Team: 1 Eurovision data

Your overall evaluation:

Outstanding

Very Good

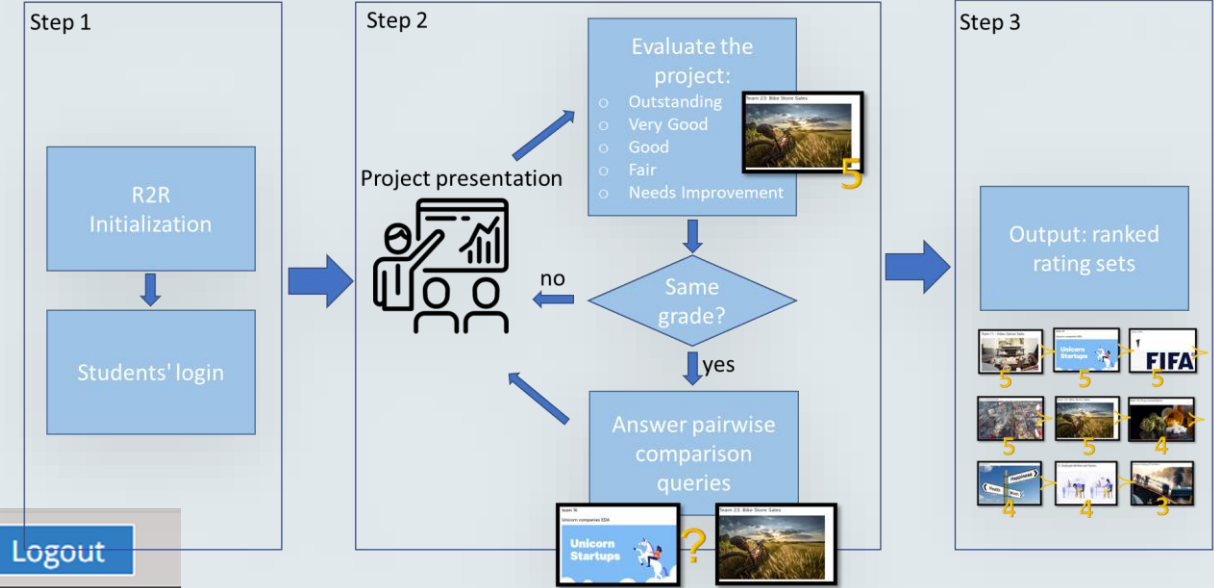
Good

Fair

Needs Improvement

Your feedback

## R2R for Peer Assessment



R2R

Logout

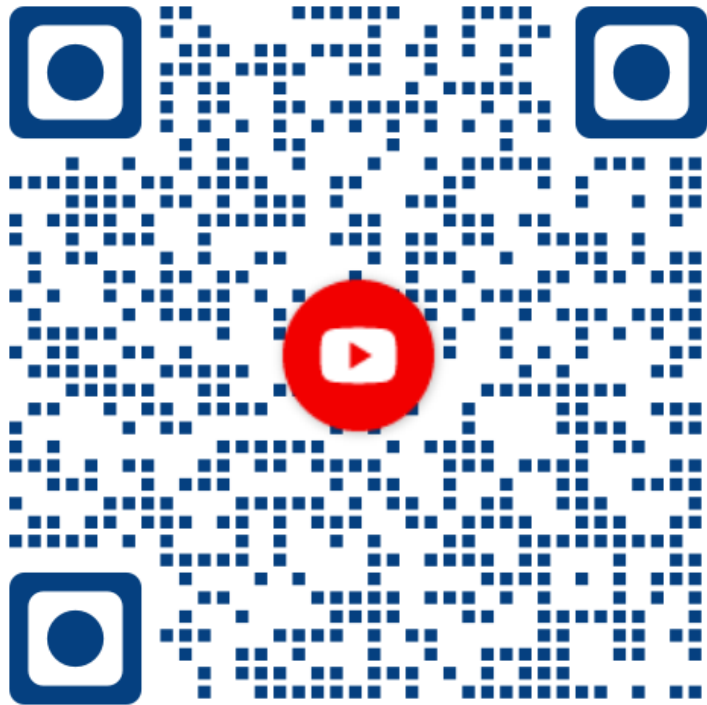
You gave the same evaluation to  
team 1: Eurovision Data  
And  
team 2: Transportation in Jerusalem  
Which is better ?

Team:1

Team:2

# “All life is problem solving”

Karl Popper



- Combine theory & applications
- LLMs
- AI
- Fairness
- Decision-making