COMP9208
Artificial Intelligence and Society

Lecture 10: 17 October 2025

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Date	Week: Lecture	Assignment
08/08	1: History of AI	
15/08	2: History of AI + Perception and Actuation	
22/08	3: History of AI + Representation and Reasoning	
29/08	4: Machine Learning	
05/09	5: Natural Interaction	
12/09	6: Distributed AI (swarm intelligence)	
19/09	7: From Good Old-Fashioned AI (GOFAI) to Artificial General Intelligence (AGI)	# 1: Individual assignment (article review)
26/09	8: Goal-driven AI: search & rescue vs lethal autonomous weapon systems (LAWS)	
03/10	**BREAK**	
10/10	9: Review: language models, search trees, situated behaviours, neural networks	
17/10	10: Robotic swarms: RoboCop vs RoboCup	
24/10	11: Group Presentations	# 2: Group assignment
31/10	12: Adversarial Machine Learning → H70.02.2140	
07/11	13: Limits of cognition	
17/11	14: STUVAC	# 3: Individual assignment (data analysis report)

Assignment #2
(group presentation)

Prepare a presentation video (10 minutes), upload it to a platform of your choice, and send an email with a video link to mikhail.prokopenko@sydney.edu.au

Upload presentation slides to Canvas (with your Group ID in the file name)

Deadline for slides upload: **23 October, Thursday, 11:59 pm (week 11)**

Q&A: 24 October (in class): 7 minutes Q&A for each group

There will be 22 groups in total: 8 groups with 5 students, and 14 groups with 4 students

Questions

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RoboCup

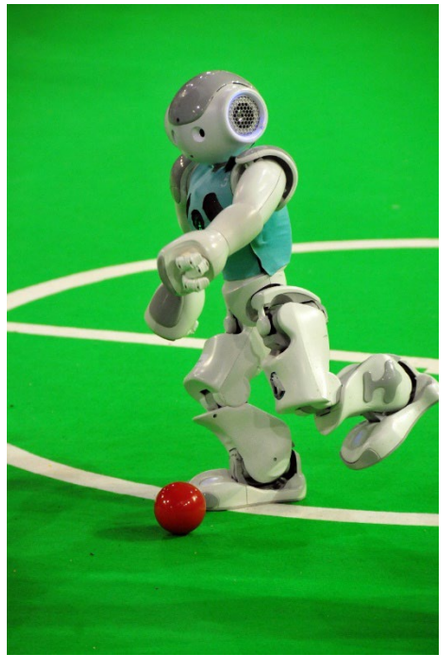
Objective:

"By the middle of the 21st century, a team of fully autonomous humanoid robot soccer players shall win a soccer game, complying with the official rules of FIFA, against the winner of the most recent World Cup."

"It took only 50 years from the Wright Brothers' first aircraft to the Apollo mission, to send a man to the moon and safely return him to the earth."

"It also took only 50 years, from the invention of the digital computer to Deep Blue, which beat the human world champion in chess."

"Building **a humanoid soccer player** requires an equally long period and extensive efforts of a broad range of researchers, and the goal will not be met in the near future."

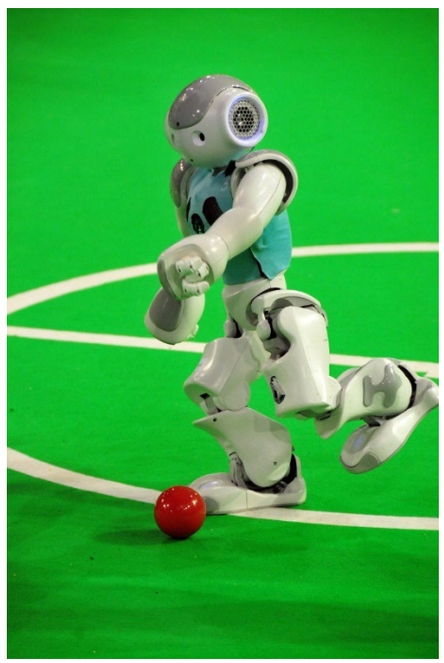


https://www.robocup.org/objective
https://en.wikipedia.org/wiki/RoboCup

RoboCup

Chess versus RoboCup:

	Chess	RoboCup
Environment	Static	Dynamic
State change	Turn taking	Real time
Information accessibility	Complete	Incomplete
Sensor reading	Symbolic	Non-symbolic
Control	Central	Distributed



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RoboCup

RoboCup Simulation 2D League:

- distributed client/server network architecture
- fragmented, latent and imprecise (noisy) information about the environment
- concurrent communication with a medium-sized number of agents
- heterogeneous sensory data (visual, auditory, kinetic)
- limited range of basic commands/effectors (turn, kick, dash, …)
- heterogeneous agent types
- asynchronous perception-action activity and limited time to perform an action
- autonomous decision-making under teamwork (collaboration) constraints
- no centralised controllers and no centralised world model (no global vision)
- conflicts between reactive and deliberative behaviours
- adversarial environment with active opponents (competition)

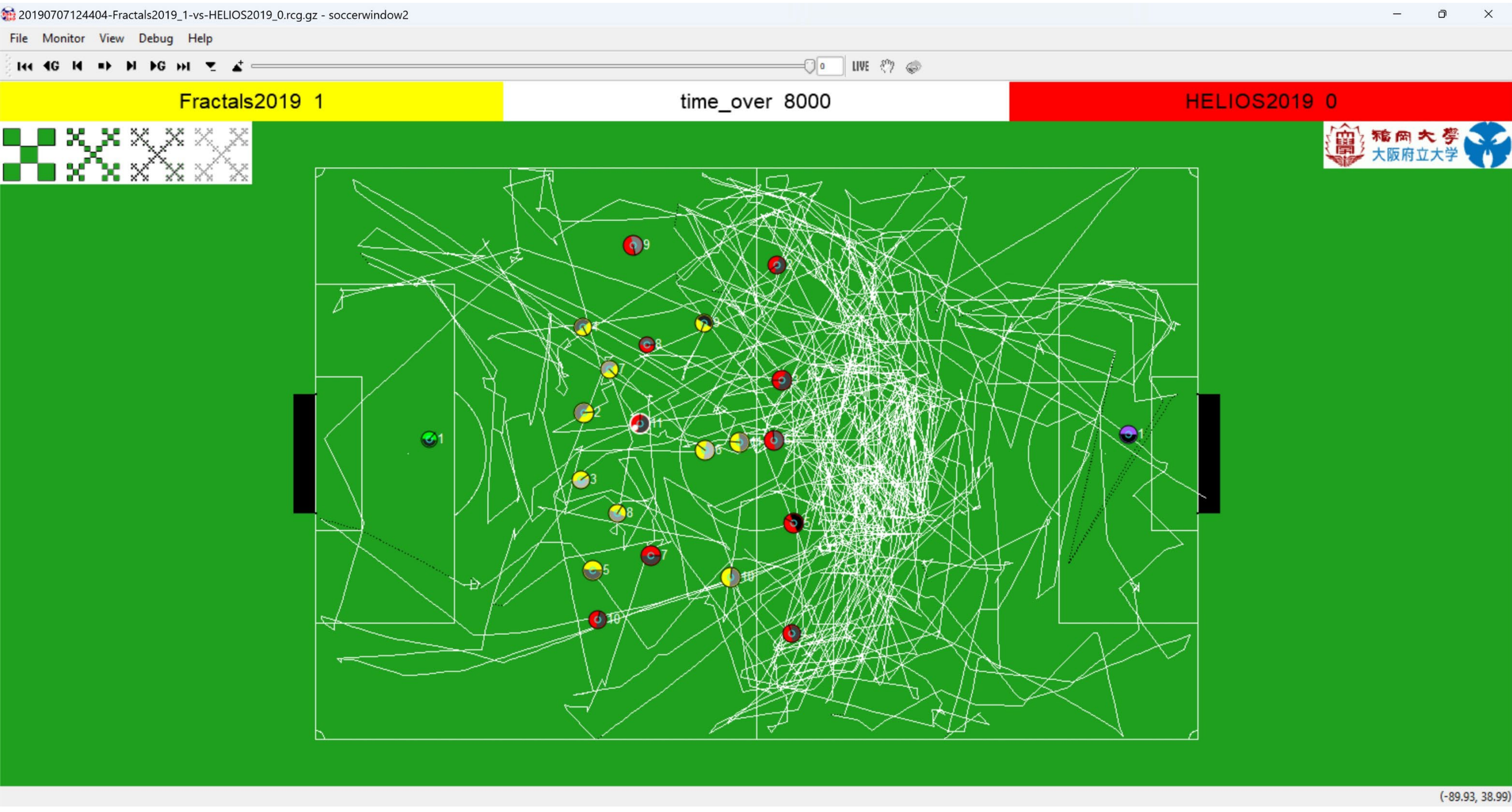
RoboCup

RoboCup-2019 (Sydney, Australia): Simulation 2D League final

https://www.youtube.com/watch?v=BVMat_hAxss

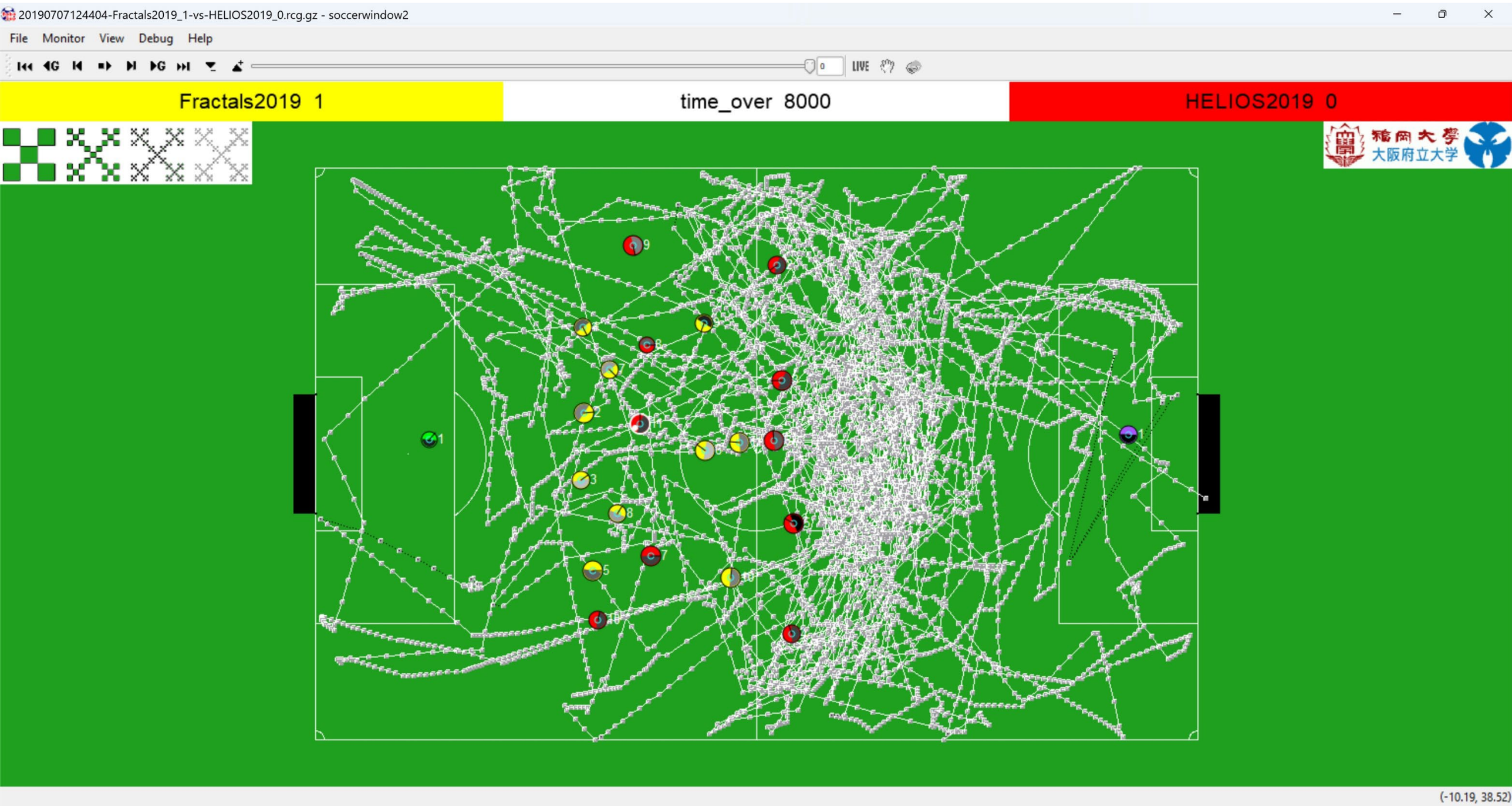
RoboCup

RoboCup-2019: Simulation 2D League final (ball trace – line)



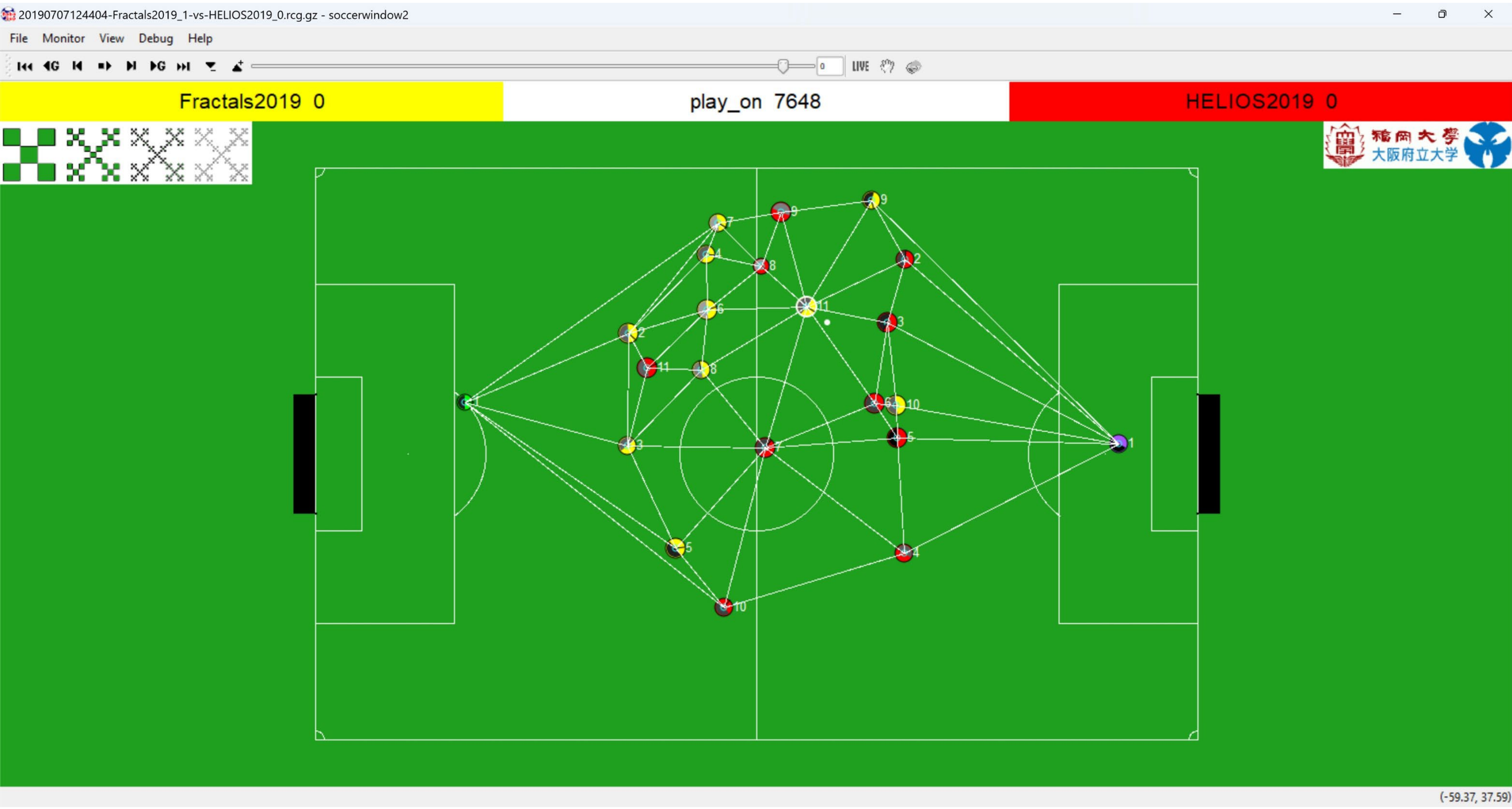
RoboCup

RoboCup-2019: Simulation 2D League final (ball trace – point)



RoboCup

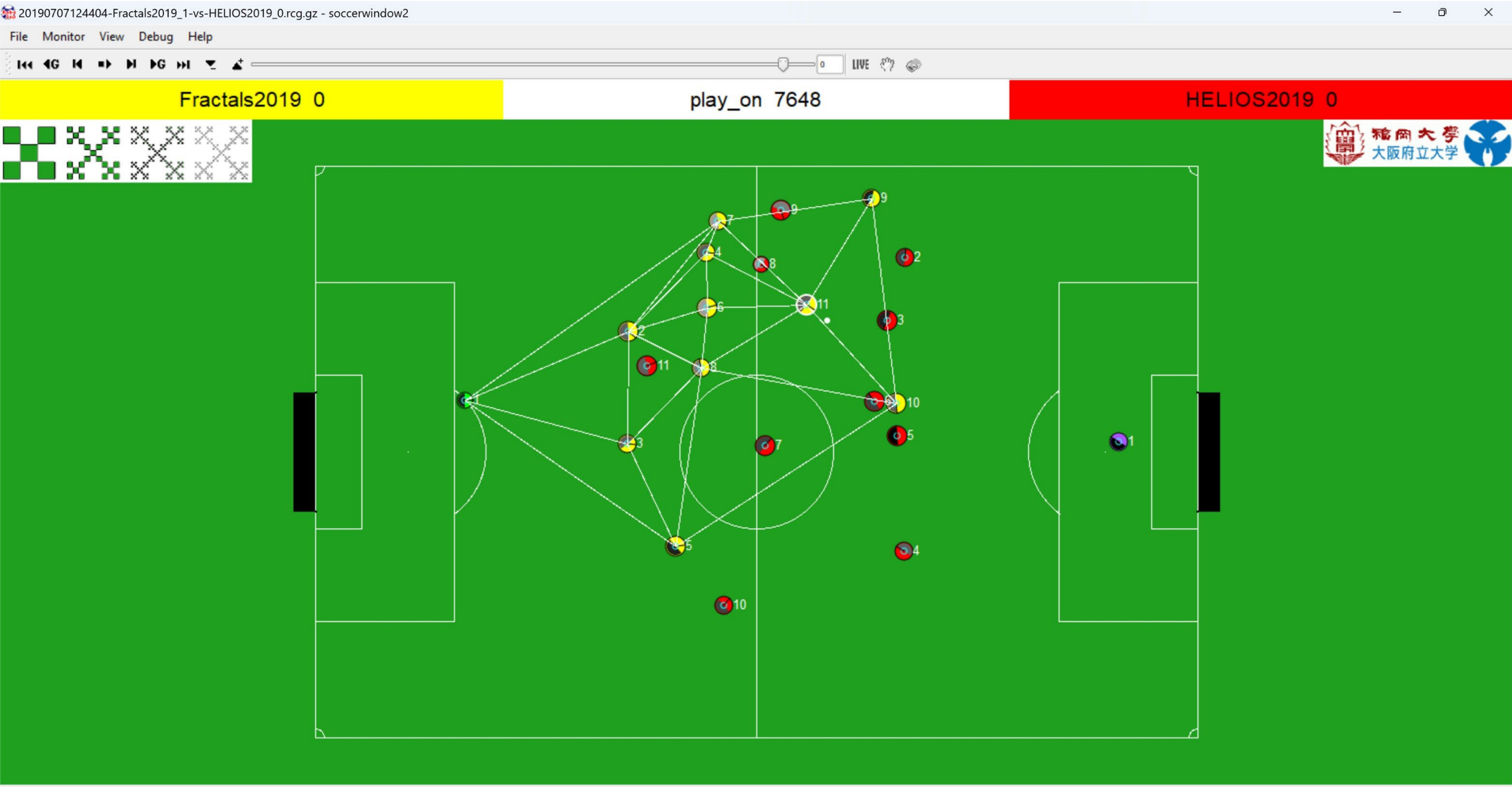
RoboCup-2019: Simulation 2D League final (Delaunay triangulation, cycle 7648)



https://en.wikipedia.org/wiki/Delaunay_triangulation

RoboCup

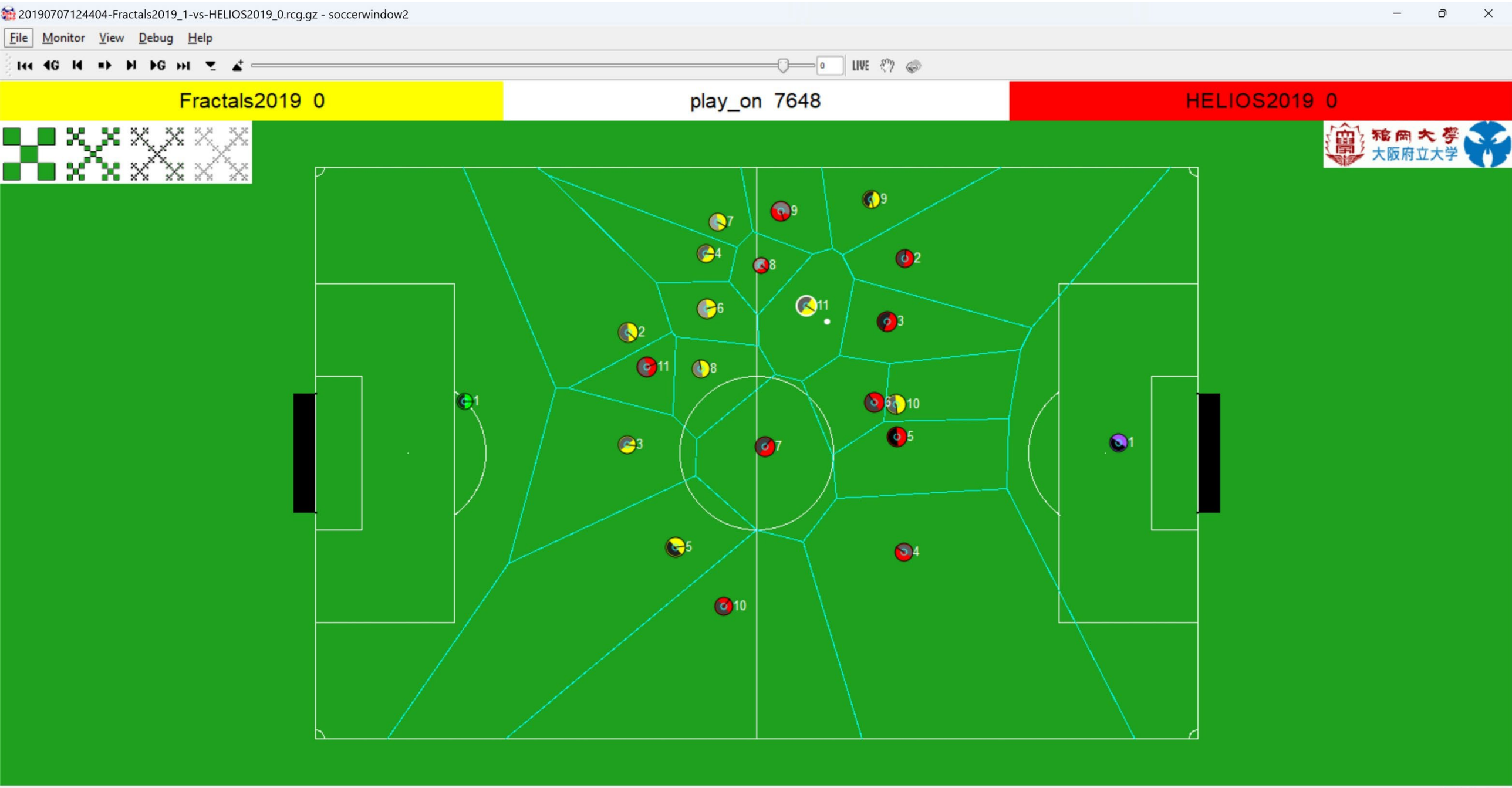
RoboCup-2019: Simulation 2D League final (Delaunay triangulation: left team)



https://en.wikipedia.org/wiki/Delaunay_triangulation

RoboCup

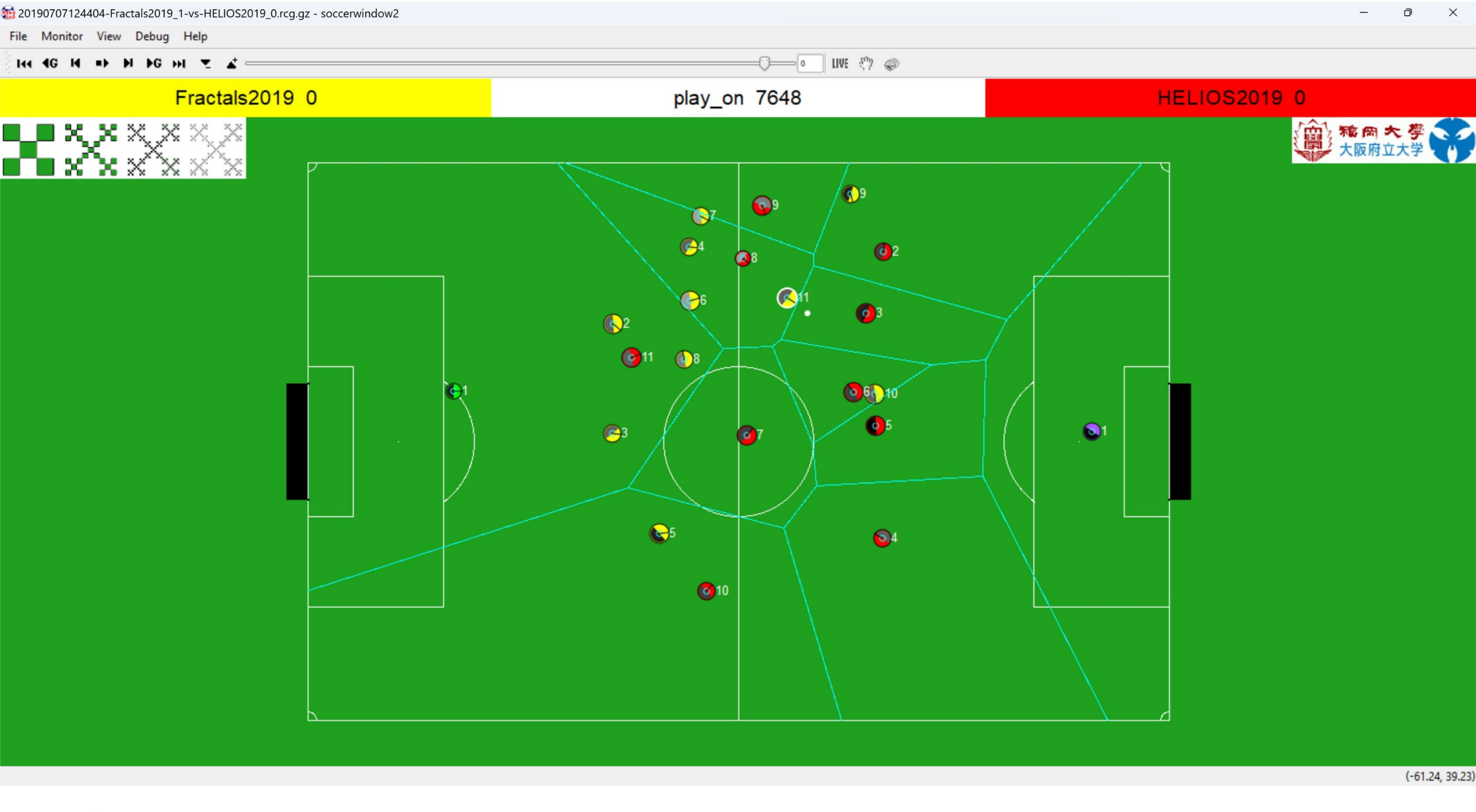
RoboCup-2019: Simulation 2D League final (Voronoi diagram: all, cycle 7648)



https://en.wikipedia.org/wiki/Voronoi_diagram

RoboCup

RoboCup-2019: Simulation 2D League final (Voronoi diagram: right team)



https://en.wikipedia.org/wiki/Voronoi_diagram

Questions

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Break

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RoboCup

Small Size League final (2023)

https://www.youtube.com/watch?v=ZLCrtapFmfQ

RoboCup

Middle Size League final (2019)

https://www.youtube.com/watch?v=_Y5_iGxWFrQ

RoboCup

Standard Platform League final (2016)

https://www.youtube.com/watch?v=XgRw42oHN-Y

RoboCup

Humanoid Kid Size League final (2022)

https://www.youtube.com/watch?v=zXyxvgWSAdQ

RoboCup

Humanoid Adult Size League final (2022)

https://www.youtube.com/watch?v=l-yeuE9hcMY

Questions

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Robocop

“How Fearful Should We Be of Robot Police?”

https://www.youtube.com/watch?v=KYxfcnHVPMs

Robotic Law Enforcement

Ethical concerns:

- use of force
  - the deployment of robots capable of using force, whether lethal or non-lethal, raises ethical questions about the appropriate use of such force and the potential for misuse or malfunction
  - the use of robots in situations involving force can dehumanize interactions between law enforcement and the public, potentially escalating situations rather than defusing them
- bias and discrimination
  - law enforcement AI systems can amplify biases present in their training data, leading to discriminatory practice, unfair targeting of groups based on race, gender or socio-economic status
  - ensuring that robotic law enforcement systems treat all individuals equitably is challenging
- accountability and responsibility
  - if a robot makes a wrong decision, it's unclear whether the blame lies with the manufacturer, the programmer, or the law enforcement agency deploying it
  - the decision-making processes of AI and robotic systems are often opaque, making it difficult to understand how they reach conclusions and who is responsible for their actions
- privacy
  - robotic surveillance can collect vast amounts of data, potentially leading to invasive monitoring and tracking of individuals, with data security compromised by unauthorised access and misuse

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Robotic Law Enforcement

Ethical concerns:

- autonomy and control
  - over-reliance on autonomous systems without adequate human oversight and intervention can lead to ethical and practical issues
  - the extent to which robots should be allowed to make autonomous decisions, especially in high-stakes situations, is a major ethical concern
- employment and labour
  - the introduction of robots into law enforcement may lead to job displacement for human officers, raising concerns about the socio-economic impact on those workers
  - the changing role of human officers in a context where robots perform many tasks traditionally done by humans may negatively affect the effectiveness and humanity of law enforcement
- public trust and acceptance
  - public trust in law enforcement may be undermined if people do not trust the technology or feel it is being used against them rather than for their protection
  - if the public perceives these systems as unfair or biased, it can lead to resistance and decreased cooperation with law enforcement

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Robotic Law Enforcement

Mitigation of ethical concerns:

- use of force
  - develop and enforce clear and strict guidelines and protocols for the use of force by robotic systems, prioritising de-escalation and the preservation of life
  - require that any use of force by robots is subject to real-time human oversight and intervention, with humans having the final say in critical decisions involving force
- bias and discrimination
  - use diverse and representative datasets for training AI systems to minimise biases; implement regular audits to identify and correct any biases that emerge
  - design and deploy systems with fairness in mind, ensuring that they do not disproportionately target or disadvantage any group
- accountability and responsibility
  - establish laws and regulations that define the accountability and liability of all parties involved in the deployment and operation of robotic law enforcement systems
  - ensure that the algorithms and decision making of robotic systems are transparent and explainable
- privacy
  - implement stringent data protection measures, including encryption and access controls, gathering only minimally necessary data and retaining it only for as long as needed

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Robotic Law Enforcement

Mitigation of ethical concerns:

- autonomy and control
  - design robotic systems with human-in-the-loop capabilities, ensuring that human operators can intervene and override autonomous decisions when necessary
  - implement tiered levels of autonomy based on the task's complexity and potential impact, reserving full autonomy for low-risk scenarios and requiring human supervision for high-risk situations
- employment and labour
  - develop programs to help displaced workers transition to new roles, including retraining and upskilling opportunities
  - redefine the roles of human officers to complement robotic systems, focusing on tasks that require human judgment, empathy, and interaction
- public trust and acceptance
  - engage with the community through public consultations and participatory design processes so that the deployment of robotic law enforcement systems aligns with public values and concerns.
  - maintain open communication with the public about the use, capabilities, and limitations of robotic systems; provide clear information about how these systems enhance safety and protect rights

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Discussion

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Homework

- check the information sources provided on different slides (at least some)

- consider ethical concerns arising in the case studies you are developing for assignments #2 and #3

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