

Data of courses form

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Title of the course: Cognitive Robotics - Engineering View

Short syllabus of the course, with topics addressed in each lecture:

Day 1: Introduction to cognitive Robotics - Engineering view

This will be introduction to engineering understanding of Cognition and review of 2 basic elements of cognitive robotics including Artificial Intelligence and Robotics. The introduction will be held in sense of IT technology and in understanding that Intelligent Machines and Cognition are very similar notions. The Scifi-movies and their technological aspect will be mentioned and proposed for student analysis in team group. Also Ambient Intelligence notion will be presented as a part of Cognitive model and Cognitive Engineering understanding. The lecture will have number of questions for final exam as follows :

1. What is Cognitive system – engineering view ?
(basic features, give examples ..)
 2. History of Robotics (where are the roots, Shape of the Robots
Legal Issues, Human-Robot interaction, Cloud Robotics, What is Uncanny
valley theory ? What are Asimov Laws ?
 3. What is AI – what is a motivation, when was AI officially
established, what is MIQ , where we can find knowledge, what
affective computing, what is Kansei engineering and Tacit
knowledge , what are networked systems, What is WILKI,
What is weak AI, what is Strong AI, what is Singularity and AI.
 4. Pls read a ISTAG stories and analyze - 4 groups (discuss
internally and present)
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Day 2 : Artificial Intelligence and Learning

This lecture in the second day will be focused on the basic element of Artificial Intelligence – namely computational intelligence. The basic notions of Classification will be mentioned and also foundations of neural networks, fuzzy systems and evolutionary computation will be reviewed. The basic of Learning systems will be presented including basic scheme of learning proposed by prof. Pal. The lecture will have number of questions for final exam as follows :

1. What is Abyss of cognitive processes ?
2. What is Not a mathematical function ?
3. Describe a principle of Turing Test
4. Describe a principle of Chinese Room experiment
5. What is your view about Machine thinking ?
6. What is a feature space ?
7. What is a scheme for Classification / decision modeling?
8. What is a confusion matrix ?

9. What is a learning by examples (representing sets)
 10. What is a Error space
 11. What is a universall aproximation theorem ?
 12. Describe a basic principles of neural networks (when we can use neural networks)
 13. What is a fuzzy sets , structure of fuzzy system (when we can use fuzzy systems)
 14. What is a possibility space , what is a fitness function
 15. What if fitness function does not exist
 16. What was a Enigma breaking code about ?
 17. What is a evolutionary computation , what is evolutionary proگرامing ?
 18. Intelligent products are realy Intelligent ??
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Day 3 : Cloud Robotics and importance for Cognitive Robotics

This lecture will be giving review of Integration of Cloud Computing and Robotics and AI. The basic notions of Cloud Computing will be mentioned and also integration of Robotics and AI will be pointed out. The important parts of Human Robot interaction including affective computing and Wizard of Oz approach will be presented. The Autonomous Wizard design will be explained for various applications. The lecture will have number of questions for final exam as follows :

1. How to buy a powerful computer in 2016 ?
2. What are examples of Smart product of today and tomorrow ?
3. What is a Cloud Computing , advantages and problems
4. What is incremental and what is a social learning
5. Could describe a Cloud Robotics approach ?
6. What types of AI bricks are on the Cloud ?
7. What is Search Based AI ?
8. Describe Cloud based implementation of neural networks and Fuzzy Systems

9. What are 3 different understand of Robots ?
 10. What is a concept of Industry 4.0 ?
 11. what is Affective Loop - what is a role of Wizard of Oz ?
 12. Describe Sensing part of the Wizard of Oz
 13. What does it mean Autonomous Wizard of Oz
 14. What is your opinion about Cloud Based technologies ?
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Day 4 : Discussion day :

1. Presentation of 4 students groups from
15 minutes each group + discussion , pls choose a form of presentations

<http://cordis.europa.eu/pub/ist/docs/istagscenarios2010.pdf>

2. Presentation of 4 student's groups about the movies

Structure of the presentation:

- a) Main idea
- b) Technological aspects
- c) Your personal emotions while watching a movie
- d) What is your opinion / will be happening in the future ???

3. Review of the questions from each lectures... (discussion)
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Day 5 :

1. Exam - 4 selected questions
2. Team exam - you will be asked in team design an intelligent and cognitive system based on chosen topic - designed by teacher

Structure :

1. How this can make life easier to humans ?
2. How can this take labor from humans and give it to machine ?

3. How can this make money ?
4. What will be a concept of learning ? How the cloud will be involved ?
5. Could you get venture capital for this idea ?

Literature for this course :

Presentations presented and discussed on the course

Additional reading :

Basics of Artificial Intelligence :

Chin-Teng Lin, C.S. George LEE : a Neuro-Fuzzy Synergisim to Intelligent Systems
1996 , Prentice Hall, ISBN 0132351692

Advances in Cognitive Systems :

J.A. Crowder, J. Carbone, S. A. Friess : Artificial Cognition Architectures, 2014
Springer, New York, ISBN 9781461480716