HUMAN MEDIA INTERACTION New Curriculum
(Dirk Heylen / 2016.3.11)

What is changing?

1. All but of the 10 EC courses will be split up.
2. The content of some courses changes
3. Some new courses are introduced
4. Adjustments will need to be made to the rules for what constitutes a good study programme
5. And some courses will change names.

1. 10 EC Courses

Several 10 EC courses consisted of 2 parts. A first part which contained an introduction to the topic and a second part in which students did a research project on this topic. In several cases, there was a 5 EC course on the same topic covering and coinciding with the first part of the 10 EC course.

- The Human Media Interaction Project will remain a 10 EC course
- The Machine Learning Course will be split into a 5 EC Basic Course and a 5 EC Advanced Course
- The Information Retrieval, Brain-Computer Interfaces, Conversational Agents 10 EC courses will become 5 EC courses. These deal with the first part of the old versions.

2. Changes to the content

The content of Speech and Langugage Processing 1 and 2 has been reorganized so that SLP 1 deals with "Language" only, and SLP2 deals with "Speech" only. Also instead of dealing primarily with technology / algorithms, more attention will be paid to applications.

3. New Courses

Three new courses will be introduced

1. Trends in Human Robot Interaction
2. Affective Computing
3. Research Project in ...

The first two will highlight research topics that are central to the research carried out in the Human Media Interaction group. "Research Project in..." replaces the second part of the 10 EC courses Information Retrieval, Brain-Computer Interfaces and Conversational Agents. But also, it makes room for Research Projects in ..." Human Robot Interaction, Natural Language Machines, Speech Processing, Affective Computing.

4. Rules governing Composition of a Programme

This is stil a bit open. Here is one possibility.

- Human Media Interaction Project remains compulsory
- Computer Ethics remains compulsory (unless proven basis in BSc, e.g. CreaTe, than it becomes Elective)
- At least one course (two?) from either 2, 3, 4 from the Core Table below

Furthermore

All students take a Research Topic (10E C) + Master Thesis/Final Assignment (30 EC)
An internship (20 EC) is optional.
Besides these courses there are other courses one can take. Think of:

- Create the Future
- Design and Emotion
- Embodied Interaction
- Multi-Sensory Design
- Virtual Reality
- Advanced Database Systems
- Data Science
- Research Experiments in Databases and Information Retrieval
- Artificial Intelligence (Self-Tuition)

CORE COURSES

WAS	BECOMES	TOPICS	SKILLS	INTERACTION	COMPULSORY
-1-					
Media and Technology	Designing Interactive Experiences	HCI / Design	Tinkering	Interaction	Compulsory for HCID entry
User-Centered Design of New Media	User-Centered Design of New Media	HCI / Design	Methodology User Studies Prototyping	Interaction	Compulsory for HCID entry
HMI Project	HMI Project	HCI / Design	Tinkering User Studies	Interaction	Compulsory for all
Human Computer Interaction	Human Computer Interaction	HCI	Methodology User studies Usability	Interaction	Compulsory for HCID entry
-2-					
	Human Robot Interaction	HCI + HRI	Methodology Bais for Research	Interaction	Elective
Information Retrieval (10EC)	Information Retrieval (5 EC)	Algorithms + Applications+ HCI	Basis for Research	Interaction	Elective
Conversatio-nal Agents (10 EC)	Conversatio-nal Agent (5 EC)	Algorithms AI (NLP)	Basis for Research	Interaction	Elective
Brain-Computer Interfaces (10 EC)	BCI (5 EC)	Algorithms (signal processing) + Applications	Basis for Research	Automatic Analysis + Interaction	Elective
	Affective Computing	Algorithms + Psychology	Basis for Research	Automatic Analysis + Interaction	Elective
Ubiquitous Computing	Ubiquitous Computing	Algorithms + Applications	Basis for Research		
-3-					
Speech and Language Processing 1	Natural Language Machines	Algorithms (AI) / Application: social media	Basis for Research	Automatic Analysis	Elective
Speech and Language Processing 2	Speech Processing for Multimedia Retrieval and Social Signal Processing	Algorithms / Applications	Baiss for Research	Automatic Analysis	Elective
Image Processing and Computer Vision	Image Processing and Computer Vision	Algorithms (signal processing)	Basis for Research	Automatic Analysis	Elective
-4-					
Machine Learning (10 EC)	Machine Learning Introduction	Algorithms	Techniques	Analysis of all kinds of data sets	Elective

	Advanced Machine Learning				
-5-					
Computer Ethics	Computer Ethics		Reflection		Elective for CreaTe BSc - Compulsory for all others

HMI 2016-2017

Introduction

In the beginning of last year (2015) , a new curriculum proposal for HMI was presented at the OLC. This was based on several years of discussion with teachers and students that started in 2013 (and some discussions and ideas already before that). The conclusion was that this should be implemented and that the revised programme should start September 2015 and thus to change the OER/TER accordingly. Due to several circumstances, the OLD was not able to get this done in time.

Guiding the changes in the programme are the following ideas:

1. The programme should be a better reflection of the research in HMI. Involving students in on-going research has always been a strong point of HMI; so this point is really important.
2. The HCID variant of HMI should be integrated properly.
3. The programme should be better adjusted to the "new" types of students entering the programme; most importantly considering international HCID students and BSc CreaTe students.
4. It retains the essence of "HMI" as a combination of Artificial Intelligence (in particular the fields of spoken dialogue systems, social signal processing, affective computing, and intelligent agents/robots, ambient environments) with HCI topics (user studies interface design, evaluation). The HCID variant also adds an Innovation & Entrepreneurial aspect.
5. The ideal student combines technical skills and know-how with scientific skills and know-how with engineering/tinkering skills and with design skills and know-how. Also students are aware of the context in which HMI research/design takes place (understanding how humans or societies work and how this is relevant for science and engineering). For each of these there are minimal requirements a student should meet. Different choices in the programme can lead to different "profiles": the HMI-engineer, the HMI-scientist, the HMI-designer, the HMI-entrepreneur etc.

Points 4. and 5. are the basis for the CROHO and the attainment targets in the OER/TER - except for the I&E objectives that are particular to HCID. In the future, point 2. and 3. will need some further attention.

Components of the HMI programme

The essence:

> HMI is a combination of Artificial Intelligence (in particular the fields of spoken dialogue systems, social signal processing, affective computing, and intelligent agents/robots, ambient environments) with HCI topics (user studies interface design, evaluation). The HCID variant also adds an Innovation & Entrepreneurial aspect.

Analyzing the programme one can distinguish the following dimensions:

1. *Orientation*: the programme concerns both technology and human-related (HCI, social science courses) learning goals
2. *Skills* to be taught involve tinkering/engineering + science + design/business. Students can choose or combine. Basic engineering & Science for everyone.
3. *Parts/Wholes*: there are courses that focus entirely on interaction, others on components: some courses focus on aspects of interactive systems or on basic techniques others take "interaction" central.

Content-wise the following *topics* are dealt with in the programme.

1. Human Computer Interaction and Design
2. Interactive systems
3. Techniques to analyse human behavior automatically
4. Courses on Ethics, Society, Humanities...
5. Innovation and Entrepreneurship

Most courses combine elements of several *topics* although many have a focus on one.

1. Human Computer Interaction and Design

In the past, *Human Computer Interaction and Design* topics were mainly dealt with in the Human Media Interaction Project. Design plays an important role in *Designing Interactive Installations* (currently Media and Technology). The HCID programme requires students to study more topics. The following table shows these and how they currently map onto courses taught in the HMI programme.

HMI	**HCID**
201100126 Human Computer Interaction	Introduction Human Computer Interaction
201000113 User Centred Design of New Media	Design of Interactive Systems
192166100 Human Media Interaction project	Design Project in Human-Computer-Interaction + Evaluation Techniques
192165201 Media & Technology	Programming Interactive Systems

Other courses dealing with Design that are offered at Industrial Design Engineering that are open to HMI students are the following.

- Create the Future
- Design and Emotion
- Embodied Interaction
- Multi-Sensory Design
- Virtual Reality

2. Interactive Systems

Research in HMI is concerned with different types of *Interactive Systems*. Embodied Spoken Dialogue Systems that use techniques from Natural Language Understanding and Speech Processing form one category. These take the form of interactions with virtual humans or humanoid robotics.

- Conversational Agents
- Designing Interactive Installations (was Media and Technology)
- Information Retrieval
- Physiological Computing (was Brain Computer Interfacing)
- Human Robot Interaction
- Human Media Interaction project

In Conversational Agents there is also a lot of attention to Artificial Intelligence, whereas *Designing Interactive Installations* deals with tinkering and the design process (+user experience). Human Robot Interaction has a strong focus on HCI aspects. The HMI project integrates tinkering/making with HCI: requirements, user studies, evaluation are also a core part.

3. Techniques to Analyse Human Behaviour

The following courses[1] deal with *techniques to analyze human behaviour automatically*, each focussing on a different input modality, or in the case of Machine Learning offering techniques that can be used in any of these processes

- Natural Language Processing (was Speech and Language Processing 1)
- Processing Speech (was Speech and Language Processing 2)
- Physiological Computing (was Brain Computer Interfacing)[2]
- Image Processing and Computer vision
- Machine Learning

4. Ethics / Humanities / Social Sciences

This list was longer, but the Psychology programme does no longer allow HMI students to their courses (except for a few). Courses that focus on *reflection* (Ethics, Society, Humanities) are:

- Computer Ethics
- Philosophy of Technology

5. Innovation and Entrepreneuship

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[1] The new names are likely to change.

[2] Physiological Computing is off the table. Will be BCI (5EC) and Affective Computing (5EC)

For the HCID programme the following courses are offered for the *Entrepreneurial and Innovation* part[3]:

HMI	HCID
201500115 Innovation & Entrepreneurship	I&E Minor
201400604 Business Development Lab	I&E Minor

6. Internship, Research Topics, Capita Selecta, Final Assignment

These are courses that have an open topic, dealing with orientation on future professions (business/academic) and training as researcher.

7. Miscellaneous (not part of but possible as elective)

Furthermore we point students to some interesting/relevant courses they can take as *electives that are part of the Computer Science Master's*.

- Advanced Database Systems
- Data Science
- Research Experiments in Databases and Information Retrieval
- Artificial Intelligence (Self-Tuition)
- Ubiquitous Computing

[3] This part is not complete.

Natural Language Machines (formerly: Speech and Language Processing 1)

Course module	192166310
Credits (ECTS)	5
Course type	Course
Language of instruction	English
Contact person	Rieks op den Akker
E-mail	h.j.a.opdenakker@utwente.nl
Teachers	Rieks op den Akker Gwenn Englebienne Mariet Theune

Commented [M1]: Als de naam verandert is misschien een nieuwe vakcode nodig?

Commented [M2]: Of moet dit veranderd worden?

Leerdoelen

After completing this course, the student can:

- Apply different AI methods and techniques for natural language processing to new problems and data
- Make use of appropriate (statistical) tools and methods for linguistic data analysis to investigate aspects of language use in social communication and assess the reliability of the results.
- Demonstrate understanding of the main linguistic concepts that play a role in natural language processing.
- Indicate the strengths and weaknesses of, and the differences between, the main techniques for modelling and parsing natural languages.
- Identify and model forms of ambiguity in natural language.
- Explain the complexity of natural language and the limitations of computational models of natural language.

Inhoud

This course looks at a specific area of artificial intelligence (AI): how machines can analyse linguistic data, focusing on written language. We look at AI models such as finite state, grammatical, and statistical models (hidden Markov, bag of words), and how they are used in tools for natural language processing such as part of speech taggers, chunking and parsing tools. We also look at how machines can learn to analyse linguistic data. We discuss how these models and techniques can be applied to investigate language use in (mediated) social communicative situations.

Analysing the language that people use in various situations and media can give us interesting information about different aspects of the communicative situation. For example: what does the language that someone uses in social media tell us about his personality or about his cultural background, or about his/her mood or stance towards the topic (s)he is writing about? Or, what does the language that children use when interacting with a robot reveal about the way they see the robot?

In the lectures we will present computational models of language as well as tools and techniques that can be used to build “natural language machines” and to address interesting questions and answers concerning language use. Students will do practical lab and homework assignments in which

they will use the models and natural language processing tools to answers research questions regarding linguistic data, and carry out a small project where linguistic data analyses can give information about interesting properties of the speaker or the communicative situation. Students are also expected to present and discuss some papers on the current state of the art in natural language processing.

Assessment is done in the form of a written exam about the theoretical parts of the course, and homework/lab assignments for pairs of students. Final grading is based on marks for assignments and exam (equal weights). The course includes one or two mandatory presentations, which are not graded.

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Voorkennis

Basic programming skills (to write scripts for data analysis) and statistical analysis skills (use of SPSS or other tools).
Given the use of formal, mathematical and probabilistic methods in this course, as well as the use of algorithmic specifications based on these models, the course requires some practical experience with and feeling for mathematical formulas and formal specifications.

Materiaal

D. Jurafsky & J.H. Martin. Speech and Language Processing: International Edition. Pearson, 2nd ed., 2008, ISBN 10-0-13-504196-1 /ISBN 13-978-0135041963.

Scientific papers.

Werkvormen

Lectures

Toetsing

Written exam
Assignments

Cursus	201300239	**Machine Learning Short Course**	2015
Lange naam	Machine Learning		
Korte naam (Engels)	Machine Learning ~~Short Course~~	**Coördinerend onderdeel**	M-CSC
Lange naam (Engels)	Machine Learning Short Course	**Contactpersoon**	Poel, M. (M7640167)
Cursustype	CURSUS	**Ingangsjaar**	206
Minimum punten	5,0 EC	**Volgend collegejaar**	2017
Opmerking		**Laatste collegejaar**	
Opmerking (Engels)		**Status**	Concept
Aantekening intern	In 2014-2014 gezamenlijke Bb-course met Machine Learning (192166420)		

VOERTAAL:

Voertaal	Omschrijving
EN	Engels

VRIJE VELDEN:

Rubriek	Vrij veld	Inhoud
BLACKBOARD	COURSE-AANMAKEN	N
DEELN OPL	DEELNEMENDE OPL	M-EE

WERKVORMEN:

Werkvorm	V/D	Omschrijving	Omschrijving (Engels)	Aanw. plicht?	Inschrijven?
HC	V	Hoorcollege	*Lecture*	No	Automatisch
ASS.	V	Homework assignments	*Homework assignment*	No	
PRA	V	Practicum	*Practical*	Yes	Automatisch
ZGB	V	Zelfstudie geen begeleiding	*Self study without assistance*	Nee	Automatisch

TOETSEN:

Toets	V/D	Omschrijving	Omschrijving (Engels)	Toetsvorm	Verplicht	Aantal gelegenheden
TOETS-0	V	Homework Assignments, Practical Assignments and Written exam	Homework Assignments, Practical Assignments and Written exam	OPDR	Ja	1

Resultaatschaal: GEHEEL TOETS
Termijnbewaking resultaten? Nee
Aspecten van academische vorming
Gehele cijfers voor toetsresultaten

BLOKKEN:

Aanvangsblok	Voltijd/deeltijd	Werkvorm	Blokken
2A	V	HC	2A
		ASS	2A
		PRA	2A
		ZGB	

Aanvangsblok	Voltijd/deeltijd	Toets	Blokken
2A	V	TOETS-0	2A

DOCENTEN:

Docent	Naam
M7661509~~xxxxxx~~ M7640167	Englebienne, G (M7661509~~xxxxxx~~) Poel, M. (M7640167)

DOEL:

After completing this course successfully, the student can:

Formatted: English (United States)

- Describe and compare machine learning methods and techniques, associated complexity and the application domain. Theories and techniques include: Bayesian classification theory, Decision Trees, Linear Discrimination, Neural Networks, Support Vector Machines.
- Design, implement and systematically evaluate machine learning methods and models.

DOEL (ENGELS):
See above

INHOUD:
The course is an introduction to the theory and practicalities of Machine Learning (ML), in which the emphasis is~~will be~~ on an overview of the various techniques, their associated complexity and the application domain. We ~~will~~ also look into the theoretical aspects of machine learning techniques, such as over- and underfitting and the Bias/Variance Dilemma. Emphasis ~~will be~~is on basic ML models, on methodology (how to achieve reliable models systematically) and the evaluation of the learnt/trained models.

Prerequisites

- Working knowledge in probability theory and statistics. This is covered in the course Probability Theory (191530062), or equivalent.
- Knowledge about basic AI formalisms for defining and solving problems: search, representation of knowledge, reasoning, learning and reasoning under uncertainty. This is covered in the bachelors course Artificial Intelligence (192140302).

Content keywords Machine Learning, Supervised Learning, Bayesian Decision Theory and Models, Parametric Models, Decision Trees, Linear Discrimination, Neural Networks, Support Vector Machines, Evaluation of Classifiers.

INHOUD (ENGELS):
See above.
Prerequisites

See above

Content keywords See above.

MATERIALEN:

Volgnr	Materiaal		Omschrijving
1	BOEK	Verplicht	Christopher M. Bishop: Pattern Recognition and Machine Learning, Springer 2006. ISBN-13: 978-0387-31073-2

Cursus	192166420	**Machine Learning**	2015
Lange naam	Advanced Machine Learning	**Coördinerend onderdeel**	M-CSC
Korte naam (Engels)	Advanced ML	**Contactpersoon**	Poel, M. (M7640167)
Lange naam (Engels)	Advanced Machine Learning	**Ingangsjaar**	2016
Cursustype	CURSUS	**Volgend collegejaar**	2017
Minimum punten	5,0 EC	**Laatste collegejaar**	
Opmerking		**Status**	Concept
Opmerking (Engels)			
Aantekening intern			

VOERTAAL:

Voertaal	Omschrijving
EN	Engels

VRIJE VELDEN:

Rubriek	Vrij veld	Inhoud
DEELN OPL	DEELNEMENDE OPL	M-CSC
DEELN OPL	DEELNEMENDE OPL	M-HMI

WERKVORMEN:

Werkvorm	V/D	Omschrijving	Omschrijving (Engels)	Aanw. plicht?	Inschrijven?
HC	V	Hoorcollege	*Lecture*	Nee	Automatisch
PRA	V	Practicum	*Lab*	Nee	Automatisch
PRO	V	Project	*Project*	Nee	Automatisch
ZS	V	Zelfstudie	*Tutorial*	Nee	Automatisch

TOETSEN:

Toets	V/D	Omschrijving	Omschrijving (Engels)	Toetsvorm	Weging	Punten	Minimum cijfer	Verplicht	Aantal gelegenheden
TOETS-0	V	Assignments and final project	Assignments and final project	OPDR	1	10,0	1,0	Ja	1

Resultaatschaal: GEHEEL TOETS
Termijnbewaking resultaten? Nee
Aspecten van academische vorming
Gehele cijfers voor toetsresultaten

BLOKKEN:

Aanvangsblok	Voltijd/deeltijd	Werkvorm	Blokken
2B	V	HC	2B
		PRA	2B
		PRO	2B
		ZS	2B

Aanvangsblok	Voltijd/deeltijd	Toets	Blokken
2A	V	TOETS-0	2B

DOCENTEN:

Docent	Naam
M7661509	Englebienne, G. (M7661509)
M7640167	Poel, M. (M7640167)

DOEL:

After completing this course successfully, the student can:

- Describe and compare advanced machine learning methods and techniques. Methods and techniques include: Graphical models, Dynamical models, Deep Learning, Boosting and Committees of classifiers.

- Design, implement and systematically evaluate advanced machine learning methods and techniques.
- Apply advanced Machine Learning methods and techniques in a realistic case (taken from research projects) in the area of Human Media Interaction such as Human Behavior, Understanding, Social Intelligent Computing and Brain Computer Interfacing.

DOEL (ENGELS):

See above

INHOUD:

This advanced part of the Machine Learning (ML) course ~~will be~~is geared towards the knowledge of and the ability to apply advanced ML models and techniques, especially Graphical models, Dynamical Models, Deep Learning and Learning Committees of Classifiers, such as Random Forest, as these techniques are particularly important in the field of Human Media Interaction (HMI). In the final part of the course students will work in pairs on a realistic case (taken from actual research projects) and will have to work methodologically through the whole procedure from cleaning up data to the final model selection and performance evaluation. The emphasis of these projects will be on applications of ML in HMI related topics such as Human Behavior Understanding, Social Intelligent Computing and Brain Computer Interfacing. This course has no final exam: the grade will be based on assignments, progress presentations and the report of the project.

Prerequisites

- Basic Machine Learning course.

Content keywords

Graphical Models, Dynamical Models, Deep Learning, Random Forest, Committees of Classifiers.

INHOUD (ENGELS):

See above

Prerequisites

See above.

Content keywords

See above

MATERIALEN:

Volgnr	Materiaal	Omschrijving

1	BOEK	Verplicht	Christopher M. Bishop: Pattern Recognition and Machine Learning, Springer 2006. ISBN-13: 978-0387-31073-2

Cursus	201000078	**Brain Computer Interfacing**	2015
Lange naam	Brain Computer Interfacing	**Coördinerend onderdeel**	M-HMI
Korte naam (Engels)	BCI	**Contactpersoon**	Poel, M. (M7640167)
Lange naam (Engels)	Brain Computer Interfacing	**Ingangsjaar**	2016
Cursustype	CURSUS	**Volgend collegejaar**	2017
Minimum punten	5.0 EC	**Laatste collegejaar**	
Opmerking		**Status**	Concept
Opmerking (Engels)			
Aantekening intern			

VOERTAAL:

Voertaal	Omschrijving
EN	Engels

VRIJE VELDEN:

Rubriek	Vrij veld	Inhoud
DEELN OPL	DEELNEMENDE OPL	M-HMI

WERKVORMEN:

Werkvorm	V/D	Omschrijving	Omschrijving (Engels)	Aanw. plicht?	Inschrijven?
HC	V	Hoorcollege	*Lecture*	Nee	Automatisch
PRA	V	Practicum	*Lab*	Nee	Automatisch
ZS	V	Zelfstudie	*Tutorial*	Nee	Automatisch

TOETSEN:

Toets	V/D	Omschrijving	Omschrijving (Engels)	Toetsvorm	Verplicht	Aantal gelegenheden
TOETS-0	V	assignments + presentations + written exam	assignments + presentations + written exam	OPDR-PRES	Ja	1

Resultaatschaal: GEHEEL TOETS

Termijnbewaking resultaten? Nee

Opmerking extern

Test weight: Assignments & Presentations 10% / Final Project 90%

Opmerking extern (Engels)

Test weight: Assignments & Presentations 10% / Final Project 90%

Aspecten van academische vorming

Gehele cijfers voor toetsresultaten

BLOKKEN:

Aanvangsblok	Voltijd/deeltijd	Werkvorm	Blokken
2A	V	HC	2A
		PRA	2A
		ZS	2A

Aanvangsblok	Voltijd/deeltijd	Toets	Blokken
2A	V	TOETS-0	

DOCENTEN:

Docent	Naam
M7640167	Poel, M. (M7640167)

DOEL:

After successfully finishing the course students can independently:

- Explain the origin and properties of brain and EEG signals
- Explain and apply methods for analyzing and classifying EEG signals.
- Explain different types BCI paradigms and apply them in a BCI.

- Conduct neurophysiological data analysis using tools such as EEGLab or programming languages such as Matlab.

DOEL (ENGELS):

After successfully finishing the course students can independently:

- Explain the origin and properties of brain and EEG signals
- Explain and apply methods for analyzing and classifying EEG signals.
- Explain different types BCI paradigms and apply them.
- Conduct neurophysiological data analysis using tools such as EEGLab or programming languages such as Matlab.

INHOUD:

The course gives an introduction to Brain Computer Interfacing (BCI). The first part of the course will be geared towards knowledge and give an introduction into several BCI paradigms -- such as SSVEP, P300, N400, Imaginary movement -- signal acquisition, pre-processing techniques, classification methods and user feedback. Moreover, attention will be paid to the integration of standard Human Computer Interaction methods into the BCI domain. Students will be graded on basis of assignments, presentations and a final written exam.

Prerequisites

- Knowledge of real time systems, for example the course Real Time Systems (192130200)
- Basic Knowledge of (Digital) Signal Processing

INHOUD (ENGELS):

The course gives an introduction to Brain Computer Interfacing (BCI). The first part of the course will be geared towards knowledge and give an introduction into several BCI paradigms -- such as SSVEP, P300, N400, Imaginary movement -- signal acquisition, pre-processing techniques, classification methods and user feedback. Moreover, attention will be paid to the integration of standard Human Computer Interaction methods into the BCI domain. Students will be graded on basis of assignments, presentations and a final written exam.

Prerequisites

- Knowledge of real time systems, for example the course Real Time Systems (192130200)
- Basic Knowledge of (Digital) Signal Processing

MATERIALEN:

Volgnr	Materiaal		Omschrijving
1	STUDIEMAT	Aanbevolen	Papers

Trends in Human-Robot Interaction

Credits (ECTS)	*5*
Course type	*Course*
Language of instruction	*English*
Starting block	*1B*
Teachers	*Vanessa Evers, Khiet Truong, Jered Vroon*
Course coordinator	*Jered Vroon, j.h.vroon@utwente.nl*
Weekly meetings	*3-4 hrs*

Learning goals

After following this course, the student:

1. is aware of recent advances and challenges in the field of human-robot interaction;
2. can appropriately consider some techniques that are commonly used in human-robot interaction research, including:
    - validated questionnaires,
    - structured interviews,
    - prototyping and design of robot behaviour (basics),
    - application of social signal processing (excluding the underlying algorithms);
3. can design a study in the field of human-robot interaction that is both relevant and feasible. Here, *relevance* refers to a proper embedding of the research question with relation to other work within the field (learning goal 1), whereas *feasible* refers to the appropriate selection and implementation of techniques for answering that research question (learning goal 2);
4. can argue for and reflect on the relevance and feasibility of a study in the field of HRI in an oral and written manner.

Course description

This course aims to introduce human-robot interaction (HRI) research, as it is pursued in the HMI group at the University of Twente. Furthermore, it teaches the student the challenges and requirements connected to HRI research, which enables them to propose their own study designs and to reflect on others' study designs taking the previous aspects into account. The main result of this course will be a research proposal written by the student. Though carrying out the proposal is *not* part of the course, the student can choose to do so in a subsequent capita selecta (5ECTS, course code 192166200).

The course will provide an overview of important social and technical research challenges in HRI, as well as commonly used methods and techniques. Researchers in HRI will give guest lectures/workshops and show how these methods and techniques are applied in their own work. Students are expected to read the relevant literature and to demonstrate their understanding through small graded assignments. Parallel to all this, students will work on their own research proposal for a relevant and feasible study in the field of HRI.

The final grade will be determined based on the study proposal (50%), the presentation of the proposal (20%), the graded assignments (20%), and good citizenship (10%).

Prerequisites / Assumed previous knowledge

At the beginning of the course the student is expected to:

- Be able to design and/or set up a (small) study
- Be capable of independently finding relevant literature

Note that prior experience with HRI (research) is not a prerequisite for the course.

Estimated work load

• 8 meetings;		8x 3-4 hr -->	28 hr
- Lecture/workshop			
- Small graded assignment (6 in total)	*(Ass. 1-6)*		
- Discuss progress on proposal			
• Prepare for the meetings;		8x 4 hr -->	32 hr
- Read provided literature			
- Prepare for the workshop			
- Work on the small graded assignments			
• Work on the proposal;			
- Finding and reading related literature		32 hr +	
- Selecting topic, preparing elevator pitch	*(D0)*	6 hr +	
- Writing the draft proposal	*(D1)*	16 hr +	
- Peer reviews	*(D2)*	4 hr +	
- Preparing presentation	*(D3)*	6 hr +	
- Final proposal	*(D4)*	16 hr -->	80 hr +
			140 hr (5 ECTS)

Assessment

		Percentage of course grade	Associated deliverable/ assignment	Assessed learning goals
1	Proposal	50%	D4	1,2,**3**,**4**
2	Presentation of the proposal	20%	D3	1,2,3,**4**
3	(Reflection) exercises	20%	Assignment 1-6	**1**,**2**
4	Good citizenship	10%	D0, D1, D2, Ass. 1-6	

~~Conversational Machines~~Spoken Language Processing

Credits (ECTS)	*5*
Course type	*Course*
Language of instruction	*English*
Starting block	*?*
Teachers	*Khiet Truong, Laurens van der Werff, Roeland Ordelman*
Course coordinator	*Roeland Ordelman, roeland.ordelman@utwente.nl*
Weekly meetings	*3-4 hrs*

Commented [KT1]: Ik denk dat we een andere naam moeten kiezen, er is al een cursus Conversational Agents, dus het woord "conversational" zou ik niet gebruiken. Alternatieven:
- Spoken Language Processing
- Speech Technology
- Intelligent Listening Machines
- Artificial Listening
- Talking to Machines

Learning goals

After following this course, the student:

1. Has a general understanding of the properties of *human* speech production (articulatory phonetics) and its acoustic representation (acoustic phonetics);
2. Understands the principles behind different uses of speech technology such as automatic speech recognition (speech-to-text), speech synthesis (text-to-speech), and speaker characterization (e.g., emotions, gender, interpersonal stance, personality, etc.) for interactive speech-based applications
2. ~~Understands the principles behind decoding human speech into discrete features that can be used in conversational machines such as words, speaker labels, gender, (native) language, or emotions by means of technology;~~
3. Is able to apply, on a conceptual level, speech technology in applications that use speech for interaction (dialogue) and for search (speech retrieval);
4. Is able to design and implement an evaluation for a speech technology based application ~~(including hands-on experience by means of a small experiment)~~.
5. Is aware of the state-of-the-art in spoken language processing~~conversational machines~~ and its use in major application areas such as speech retrieval and social signal processing~~applications. Typical use cases are information processing and dialogue management, social signal processing, and application domains such as XYZ, media industry, security, automotive,~~
5.~~6.~~ Is able to perform basic acoustic analyses (e.g. extract basic speech features) with existing tools such as Praat

Course description

This course is an introduction to ~~conversational machines: systems that communicate with users through the speech modality alone, or aim to extract information from speech conversations~~spoken language processing and its applications. The course starts with providing the student with an indispensable background on human speech production and perception, focussing on the many aspects of variability in speech that have a strong impact on research and development ~~topics~~ in the context of ~~conversational machines~~speech-based interactive machines. The basic principles behind automatic speech recognition (speech-to-text), speech synthesis (text-to-speech), and speaker characterization (e.g., emotions, interpersonal stance, gender etc.) for use in speech-based interactive applications will be explained. By means of focused literature study and

practical, hands-on assignments the student will learn and experience the virtues but also the limitations of the state-of-the-art in various types of speech technologies ~~that are part of conversational machines~~. In the 2nd part of the course, the focus will be more in-depth on research topics from major speech application areas, such as speech retrieval and social signal processing.

Prerequisites / Assumed previous knowledge

At the beginning of the course the student is expected to:

- ~~Know the basics of Machine Learning (?)~~Have some experience with machine learning (see courses Machine Learning and Natural Language Machines)
- Be able to design and/or set up a (small) study
- Be capable of independently finding relevant literature and be critical about it

Note that prior experience with speech technology (research) is not a prerequisite for the course.

Estimated work load

• 16~~8~~ meetings;	16 ~~8~~x 90~~3 4~~ min~~hr~~ -->	24~~28~~ hr
• Prepare for the meetings;	8x 4 hr -->	32 hr
- Read provided literature		
- Work on the small graded assignments		
• Work on the exam;	-	80 hr +
		140 hr (5 ECTS)

Materials

- Jurafsky & Martin
- Research papers and chapters from books provided by teacher

Exams and grading

- Written exam
- Graded reading, writing, and practical assignments
- Oral presentation

Werkvormen

- Lectures

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