



EUROPEAN UNION



EDLRIS

European Driving License
for Robots and Intelligent Systems

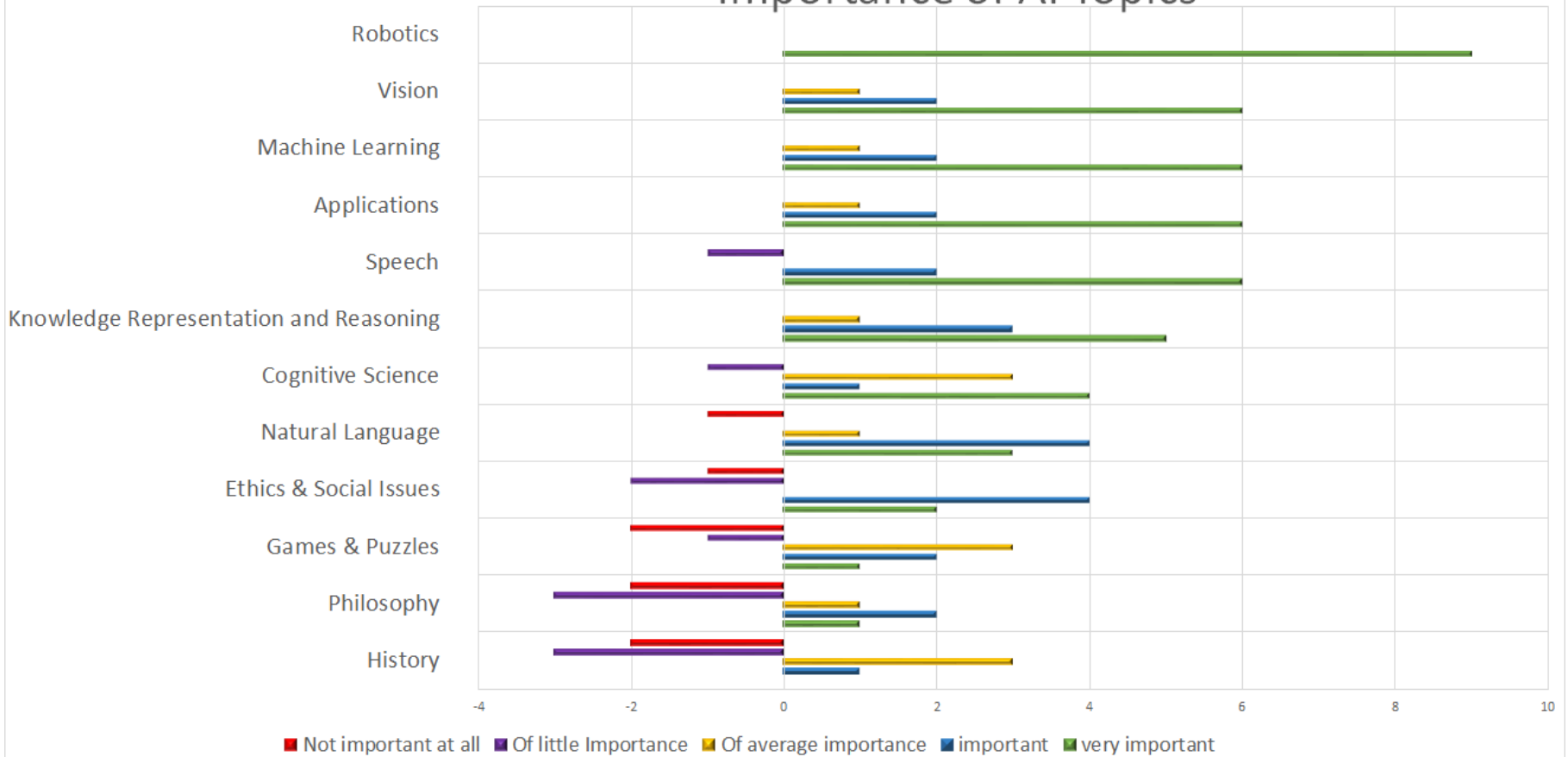
Enabling the Creation
of Intelligent Things



European Driving License for Robots and Intelligent Systems



Importance of AI Topics



What should be part of an AI syllabus?

- Definition of AI
- Applications and practical examples
- Machine learning
- Vision
- Speech recognition
- Ethics
- Mathematics - Statistics
- Gestures
- Geo-information systems
- Data Analysis

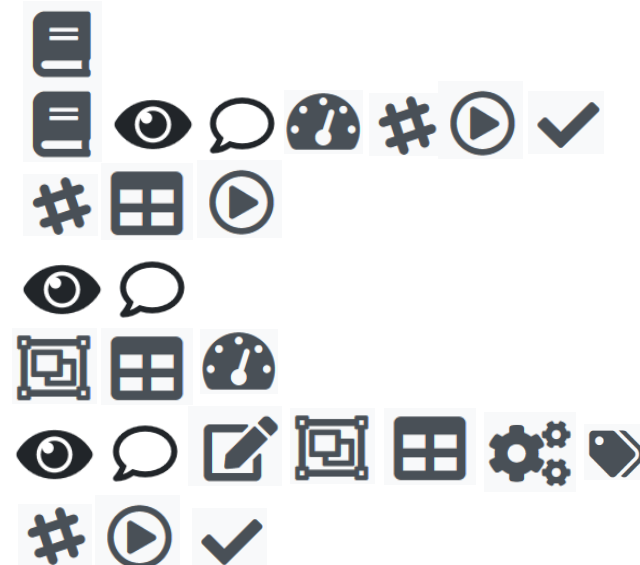
Competencies

- I can describe artificial intelligence
- I can recognize if a given system is based on artificial intelligence
- I can name areas of AI and give specific examples of AI implementations
- I can understand technical, economic, ethical and legal implications of AI
- I am aware of different problem representations
- I can formalize a search problem
- I can explain basic data structures
- I can use algorithms to solve a search problem
- I can assess the basic properties of search algorithms
- I can translate an algorithm into code
- I can implement a simple AI system
- I can assess the correctness of my solution



Course Overview

- Getting to Know Each Other
- Defining Artificial Intelligence
- Natural Language Processing
- Programming 101
- Computer Vision
- Machine Learning
- Problem Solving by Search
- Project Day

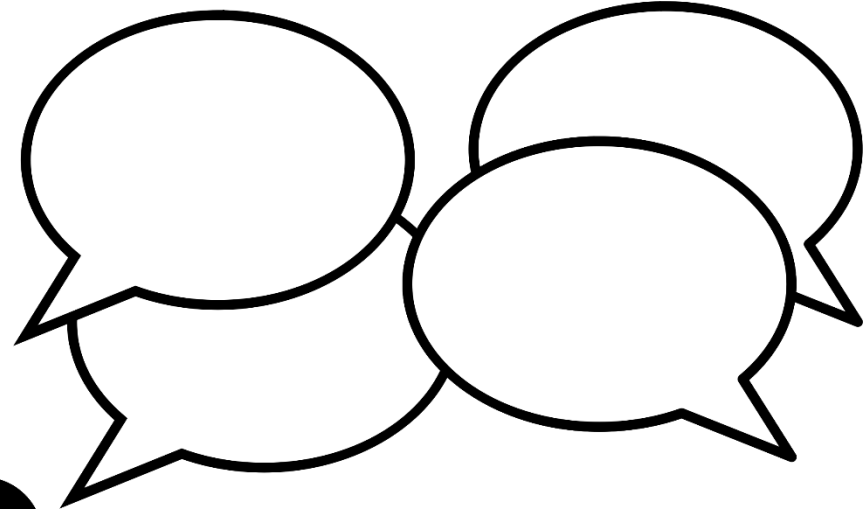
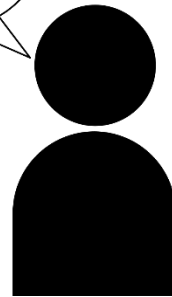
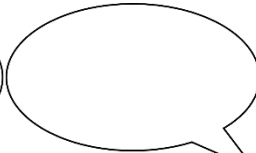
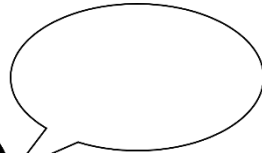
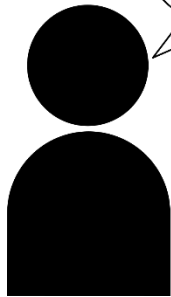
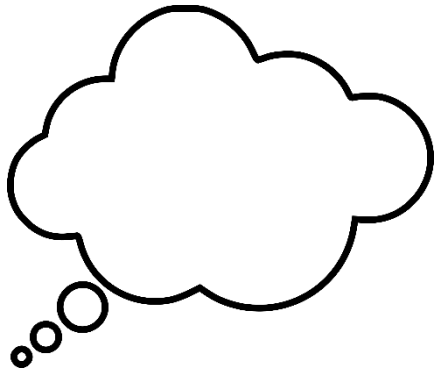


Learning Environment



Defining Artificial intelligence

Think – Pair – Share



Defining Artificial Intelligence

AI is the part of computer science concerned with designing intelligent computer systems that exhibit the characteristics we associate with intelligence in human behavior – understanding language, learning, reasoning, solving problems and so on.

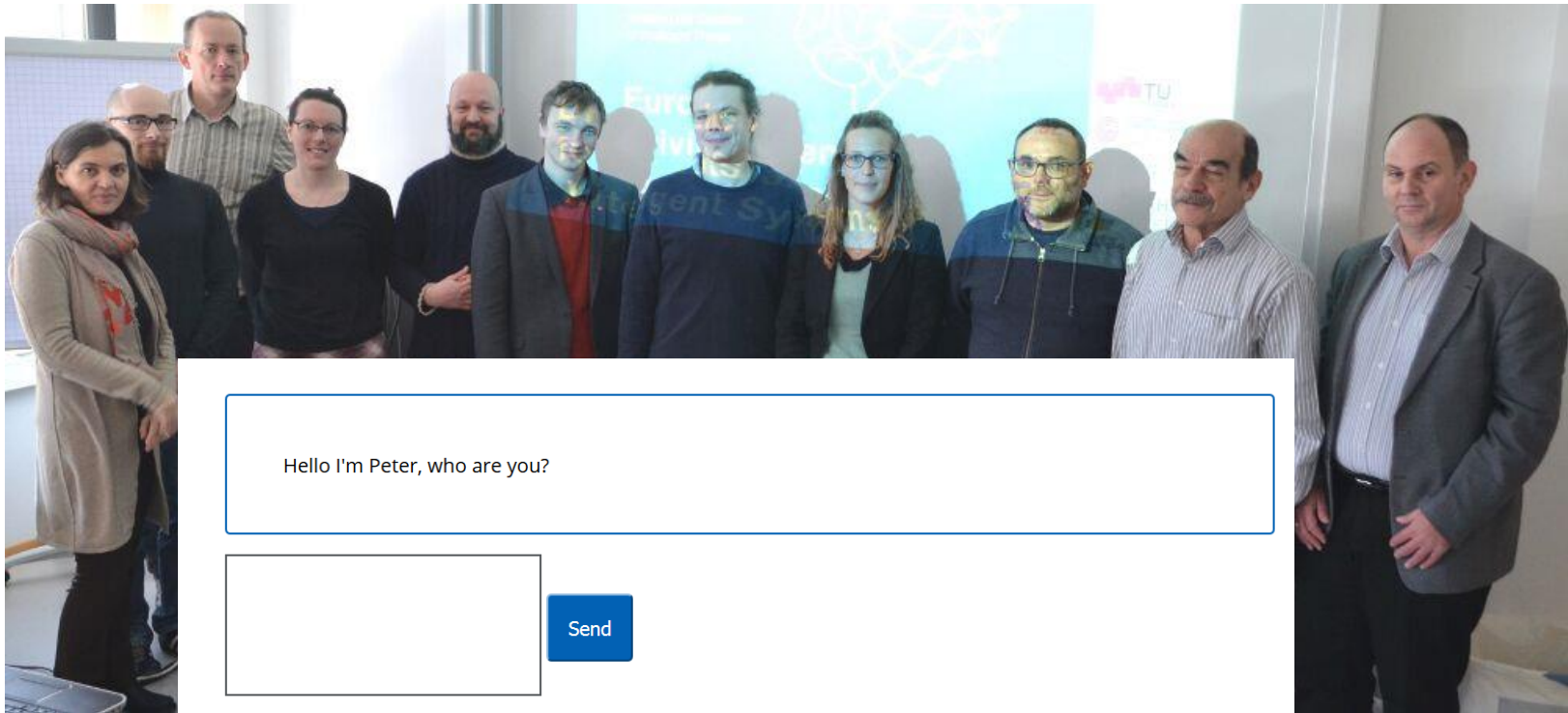
(Barr, Avron and Edward A. Feigenbaum (1981). The Handbook of Artificial Intelligence. HeurisTech Press, William Kaufmann Inc.)

We define AI as the study of agents that receive precepts from the environment and perform actions. [. . .] Ideally, an intelligent agent takes the best possible action in a situation.

(Russel, Stuart J. and Peter Norvig (2010). Artificial Intelligence. A Modern Approach. 3rd ed. Pearson.)

Natural Language Processing – Chatbots

Meet the EDLRIS Team



Interviews

- Please describe the experience you just had with the chatbot in a few words.
- What is the relation of chatbots to artificial intelligence?
- In your opinion, how could it be achieved that chatbots reliably pass the Turing Test?
- Did you have other experiences with chatbots or natural language processing systems before?
If yes: please describe them (e.g. where were they used, how did you feel interacting with the system?)
If no: can you think of some areas where natural language processing might be useful?

The Imitation Game

HOW DO YOU DO: PLEASE TELL ME YOUR PROBLEM.

I miss my mother.

I am lonely.

Replace	with	Word Fields	
AM	ARE	NEG. FEELING	SAD UNHAPPY DEPRESSED SICK
YOUR	MY		
I	YOU	FAMILY	MOTHER MOM FATHER DAD SISTER
MY	YOUR		

Keyword	Context Rule	Response-Template
YOU	* YOU ARE (?NEG. FEELING) *	<ul style="list-style-type: none"> • DO YOU THINK COMING HERE WILL HELP • YOU NOT TO BE @x? • I AM SORRY TO HEAR YOU ARE @x. • I'M SURE ITS NOT PLEASANT TO BE @x? • CAN YOU EXPLAIN WHAT MADE YOU @x?
		<ul style="list-style-type: none"> • YOU SAY @x • CAN YOU ELABORATE ON THAT? • DO YOU SAY @x FOR SOME SPECIAL REASON? • THAT'S QUITE INTERESTING

Food for Thought

Extensional Point of View

If People cannot differ a chatbot from a human, it means that the chatbot must be intelligent.

Intentional Point of View

If People cannot differ a chatbot from a human, it means that these people are just too stupid to know the difference.

The Chinese Room (argument mounted by John Searle): A person who speaks only English is given a rule book with instructions written in English, some blank paper and some slips of paper with Chinese inscriptions. Small slips of paper with Chinese inscriptions are then given to the person who follows the rules in the rule book to produce a reply. (Russel, Stuart J. and Peter Norvig (2010). Artificial Intelligence. A Modern Approach. 3rd ed. Pearson.)

If we ask the person in the room, if he/she speaks Chinese the answer is affirmative in fluent Chinese. This is enough evidence for understanding and speaking Chinese.

Although from the outside, you cannot tell if the person speaks Chinese because the responses are accurate, the person does not understand or speak Chinese, he/she just mindlessly follows a rule book.

Is it Intelligent?



Programming Introduction









print("I am an intelligent program")

I'm a computer program and I'd like to chat with you."

My friend said "I like you"

Ethics

Station Work






- Ownership – who does it serve (Changing perspective) 
- Privacy – Continue a conversation with a chatbot 
- Advertisements – Case studies 
- Abusive Language – How do you react? 
- Gender & Diversity – Reflect on your own behavior, impact on society 
- Human Impersonation – Read conversation with Bot 




Computer Vision

ABC-Graffiti

Watson sees...



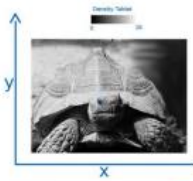
Classes	Score	JSON 
forelock hairstyle	0.85 	
pageboy hairstyle	0.63 	
female child	0.58 	
female	0.58 	

Faces	Score	JSON 
age 0 - 17	0.81 	
female	1.00 	
<i>Did We Wow You?</i> <input type="radio"/> Yes <input type="radio"/> No		

Attentive Micro-Lecture

EDLRIS Computer Vision

Pixel images



7 edlris@ist.tugraz.at

EDLRIS Computer Vision



8 edlris@ist.tugraz.at

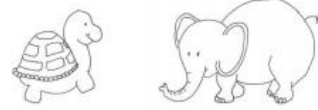
EDLRIS Computer Vision

What did you see?

9 edlris@ist.tugraz.at

EDLRIS Computer Vision


What do you see?



10 edlris@ist.tugraz.at

EDLRIS Computer Vision

Vertical Edges



11 edlris@ist.tugraz.at

EDLRIS Computer Vision

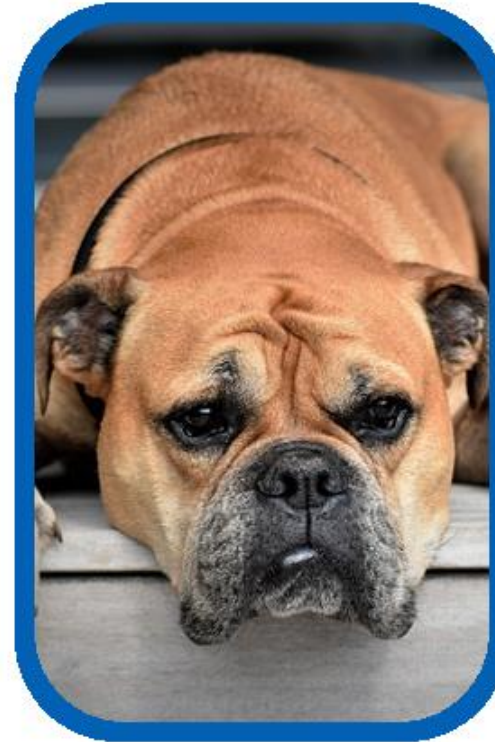
Computing Vertical Edges

	A	B	C	D	E	
a	255	255	189	49	1	Aa - Ba
b	255	239	94	1	0	Ab - Bb
c	255	249	132	4	0	Ac - Bc
d	250	250	200	57	1	Ad - Bd

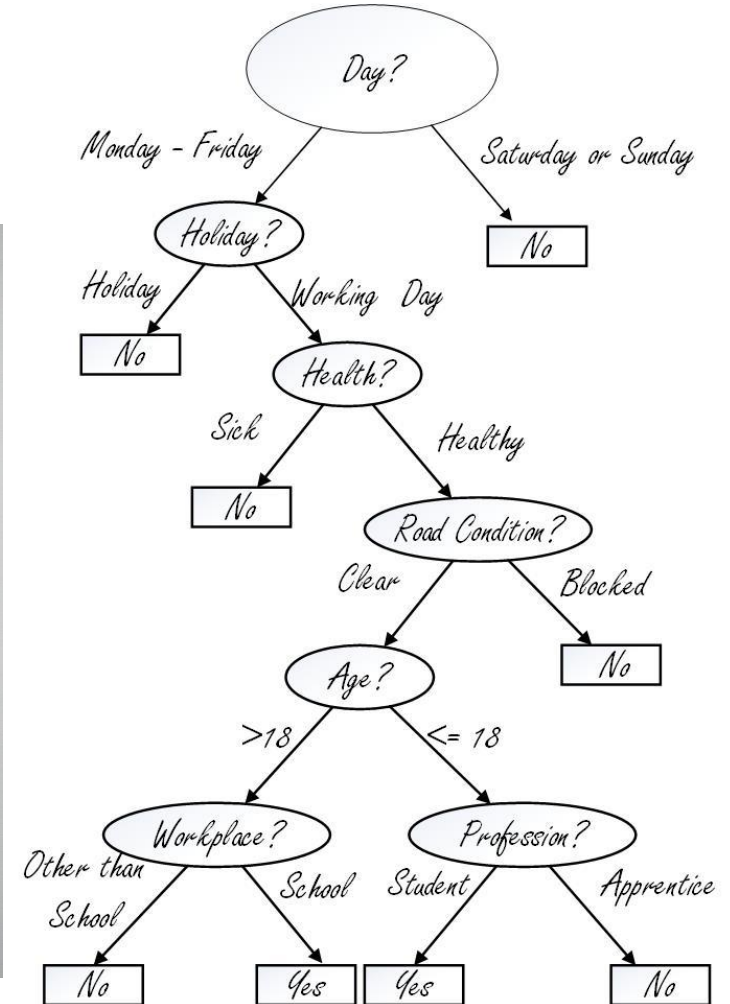
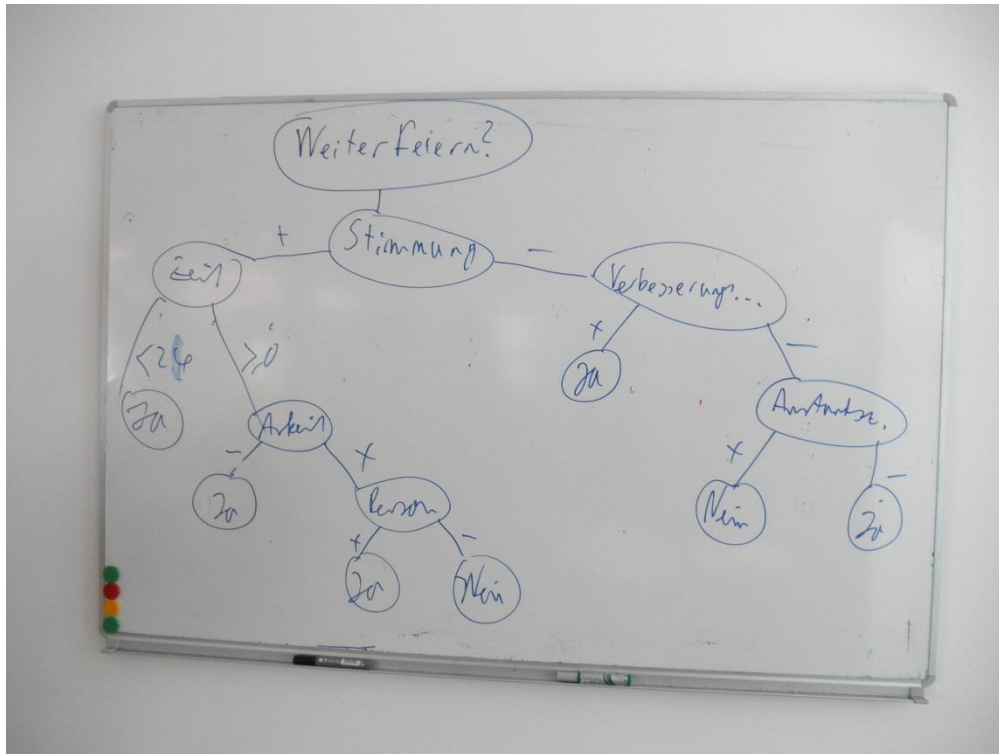
12 edlris@ist.tugraz.at

Classification

ABC-Graffiti and Cats & Dogs



Decision Trees 🗺

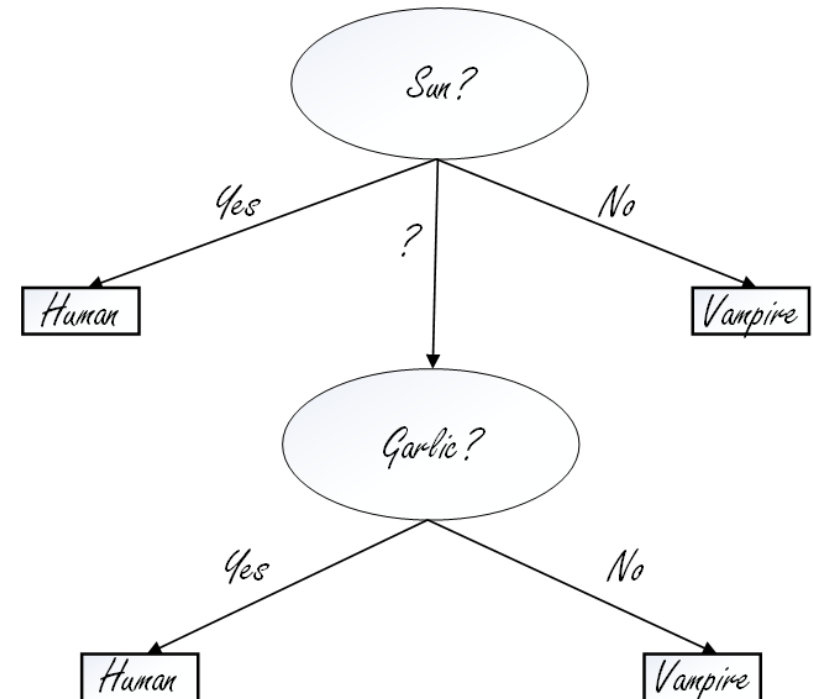


Identifying Vampires

Teach O.K.



Vampire?	Sun?	Garlic?	Complexion	Accent
Human	?	Yes	Average	None
Human	Yes	Yes	Ruddy	None
Vampire	?	No	Ruddy	None
Vampire	No	No	Pale	Heavy
Vampire	?	No	Pale	Odd
Human	Yes	No	Average	Heavy
Human	Yes	No	Pale	Heavy
Human	?	Yes	Ruddy	Odd








Identify Bloodtypes

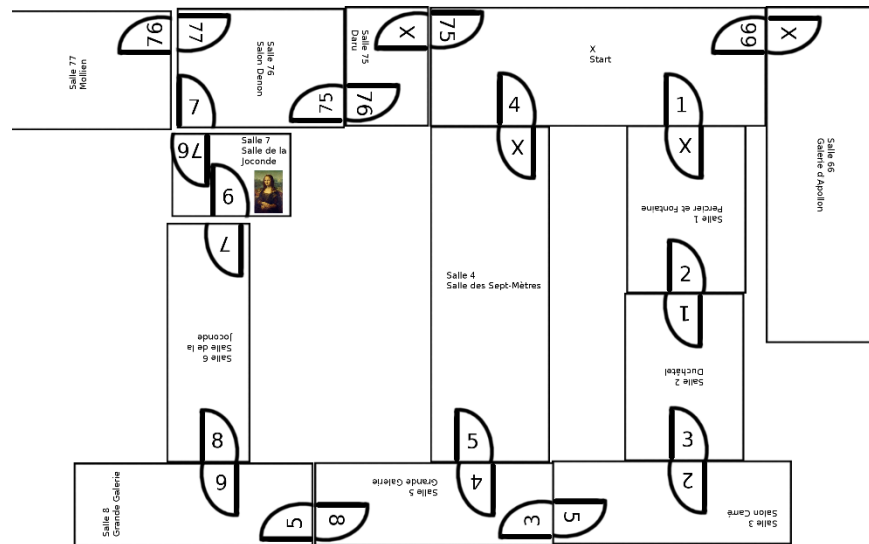
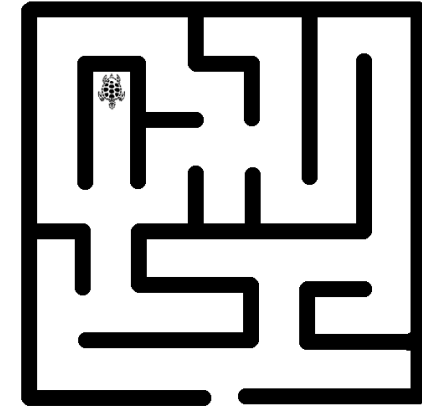
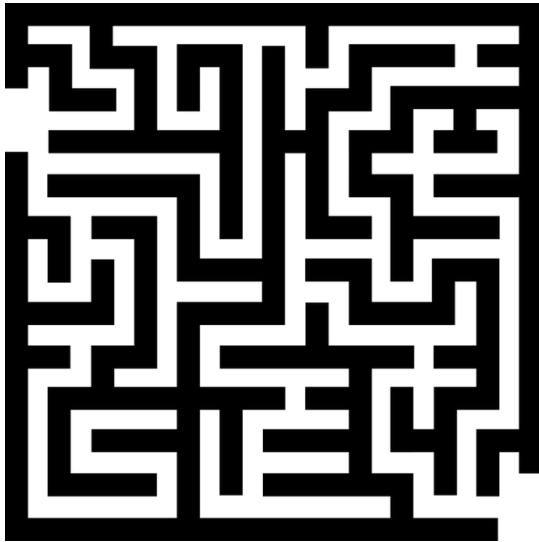
Blood Type	Mother	Father	Anti-A	Anti-B	Anti-AB
A	AB	AB	Yes	No	Yes
B	AB	B	No	Yes	Yes
O	B	B	No	No	No
AB	A	B	Yes	Yes	Yes
A	A	A	Yes	No	Yes
B	B	B	No	Yes	Yes
AB	AB	A	Yes	Yes	Yes
AB	B	AB	Yes	Yes	Yes
O	A	B	No	No	No
A	B	A	Yes	No	Yes
O	O	A	No	No	No

Ethics

Station Work

- Ownership – who does it serve (Changing perspective) 
- Privacy – Video assisting the elderly 
- Advertisements – Imagining the Future 
- Inappropriate Content – How do you react? 
- Gender & Diversity – How much trust to put into a machine learning algorithm 

Problem Solving by Search



Problem Solving by Search

Think – Pair – Share

- How are the previous short activities different and how are they similar?
- What is the goal of each of the problem sets?
- How did you tackle each of the problem sets?
- What is the relation of mazes to artificial intelligence?
- Can you name some real-world examples / applications where a generic way of solving mazes would be helpful?
- What difficulties might a computer have in solving these problems?

Problem Solving by Search

Online Session

EDLRIS
European Driving License
for Robots and Intelligent Systems

Depth First Search

EUROPEAN UNION

interreg
Austria-Hungary 2014-2020
European Union - European Regional Development Fund

www.interreg-athu.eu/edlris

What is the turtle thinking?

I go to pop(4)
 Have I reached my Goal? NO

From here I can go push()
 Have I been here before? No

Stack

9
14

Must remember! I have already been here:
1 8

Next Step

edlris@ist.tugraz.at

← PREV
NEXT →

Problem Solving by Search

Practice

