

Advanced Artificial Intelligence



“Advanced” Artificial Intelligence

Introduction

Your teachers

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Ph.D. student

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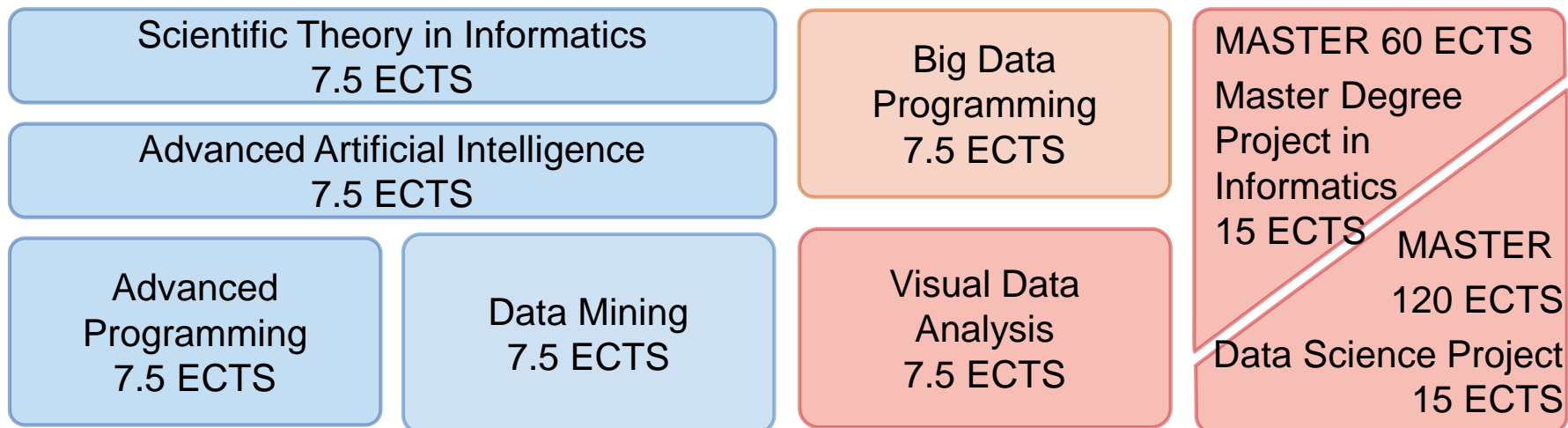
Niclas.stahl@his.se

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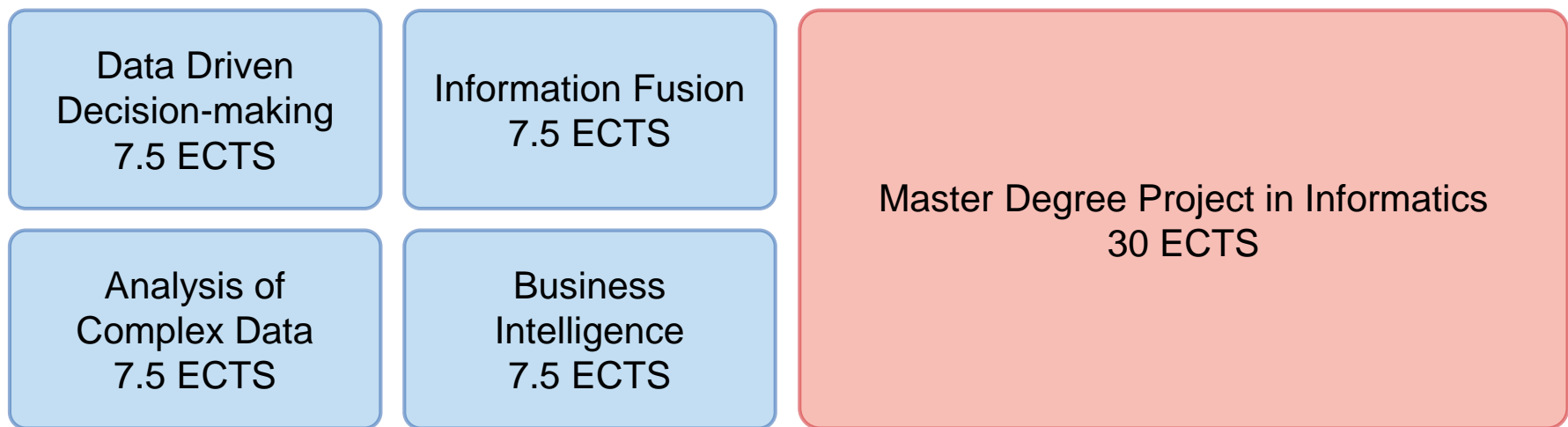
Data Science

1 or 2 year master program at the university of Skövde

Year 1



Year 2

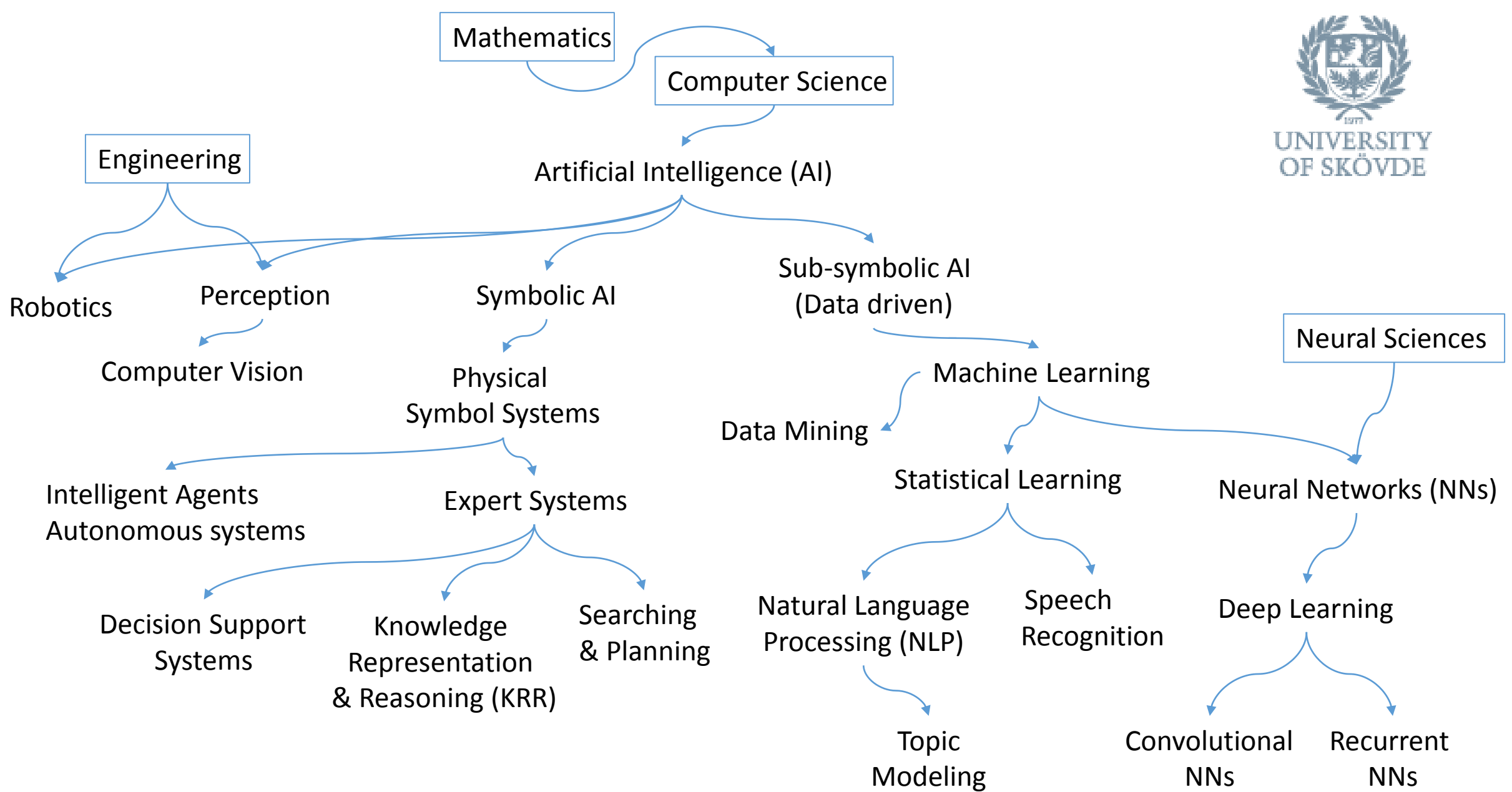


Forms of Teaching

- The teaching comprises
 - Lectures
 - Seminars
 - Presentations
 - Practical exercises
 - Written report
 - Written exam
- The teaching is conducted in English.

What is AI ?

A tiny bit of history and where we are now



Seminar assignment (1 credit)

Ethical question

- In groups of 3 or 4 students
- You prepare a 10 minutes presentation where you raise an ethical question within AI and discuss the question.
- You write a short report where you raise and discuss the question. (5 pages).

Group assignment (2 credits)

Practical assignment

Teacher: Niko Huhnstock

More info will be provided by Niko.

Examination

The course is graded

Excellent (A), Very Good (B), Good (C), Satisfactory (D), Sufficient (E), Fail (F).

- Supervised written examination¹ 4.5 credits A/B/C/D/E/F
- Seminar assignment 1 credit Pass/Fail
 - Presentation
 - Written report
- Group assignment 2 credits Pass/Fail

¹ Determines the final grade of the course, which is issued only when all course units have been passed.

Literature

Artificial Intelligence

A modern approach

Third Edition

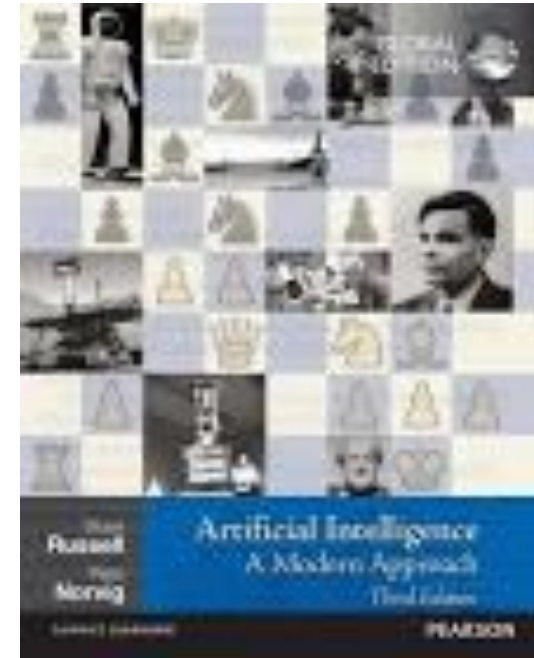
Stuart Russel & Peter Norvig

2010 by Pearson Education Inc.

ISBN-13 978-0-13-207148-2

IISBN-10 0-13-207148-7

Selected chapters



(The fourth edition is from 2020 but not yet free/not in library)

Today, AI is everywhere

Autonomous Cars

Under the bonnet

How a self-driving car works

Signals from **GPS (global positioning system)** satellites are combined with readings from tachometers, altimeters and gyroscopes to provide more accurate positioning than is possible with GPS alone

Lidar (light detection and ranging) sensors bounce pulses of light off the surroundings. These are analysed to identify lane markings and the edges of roads

Video cameras detect traffic lights, read road signs, keep track of the position of other vehicles and look out for pedestrians and obstacles on the road

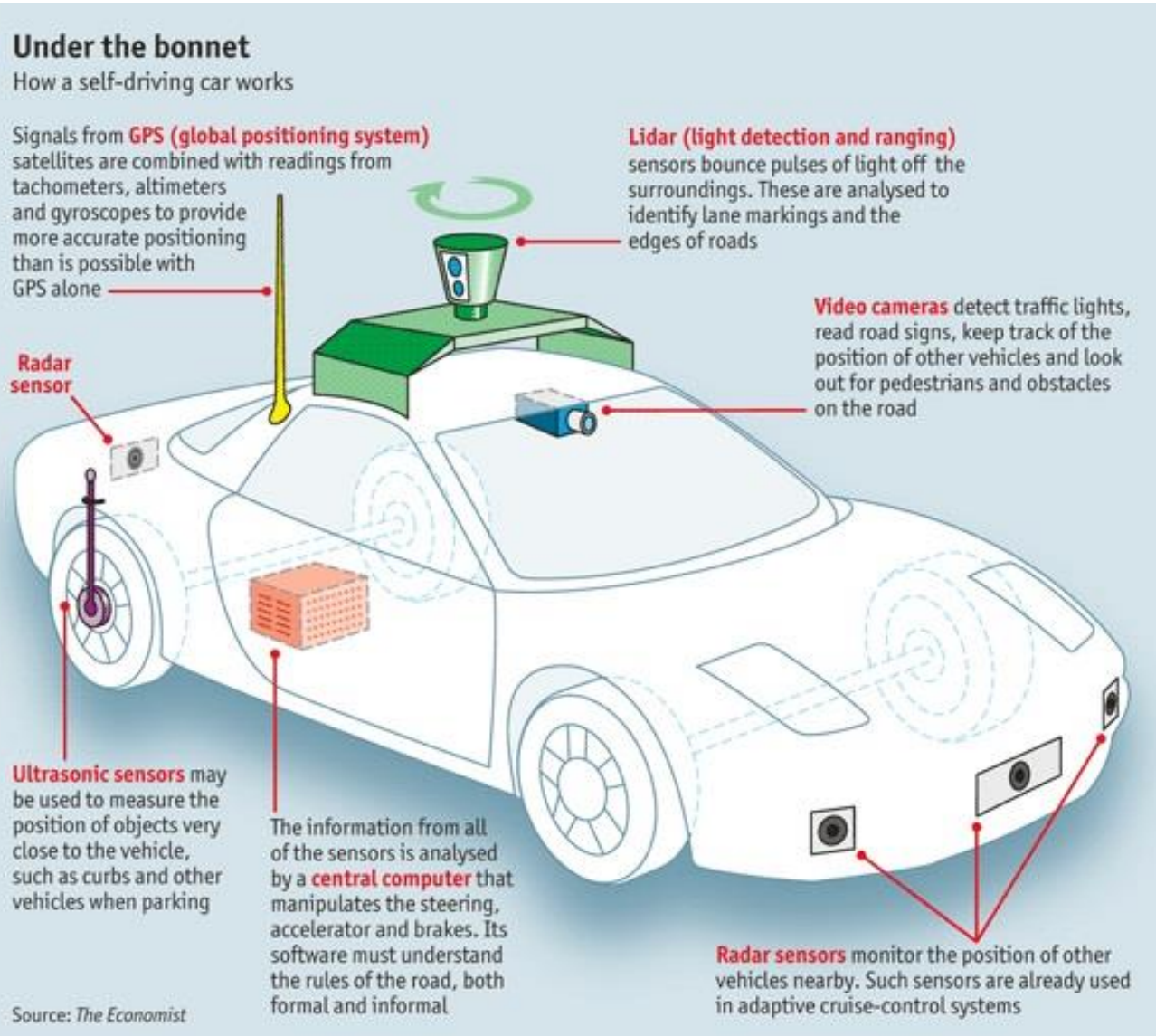
Radar sensor

Ultrasonic sensors may be used to measure the position of objects very close to the vehicle, such as curbs and other vehicles when parking

The information from all of the sensors is analysed by a **central computer** that manipulates the steering, accelerator and brakes. Its software must understand the rules of the road, both formal and informal

Radar sensors monitor the position of other vehicles nearby. Such sensors are already used in adaptive cruise-control systems

Source: *The Economist*



Intelligent refrigerator



Autonomous pizza delivery



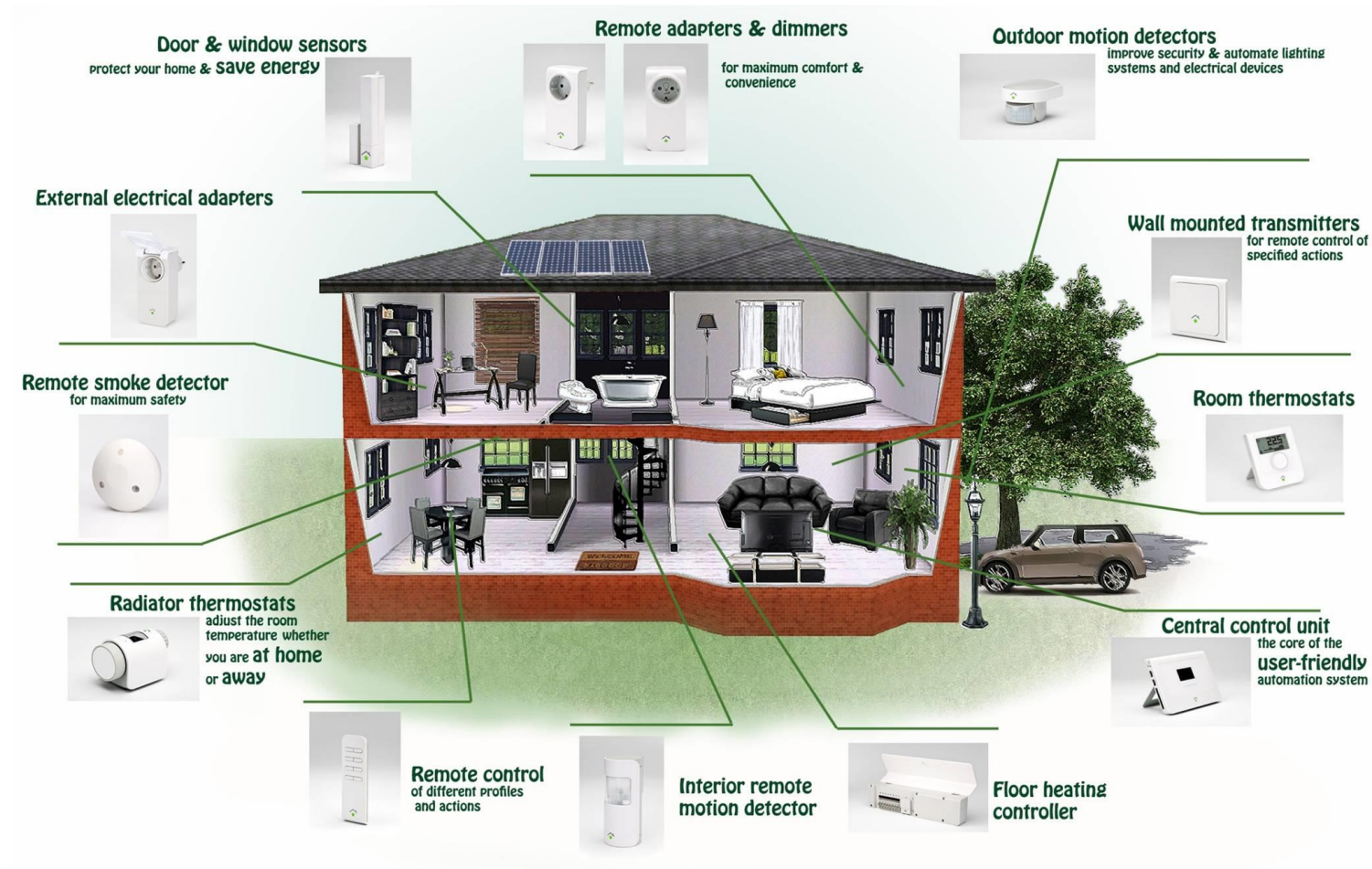
GPS



Drones



Smart homes / smart houses



Precision agriculture



Text classification

Topics

gene 0.04
dna 0.02
genetic 0.01
...

life 0.02
evolve 0.01
organism 0.01
...

brain 0.04
neuron 0.02
nerve 0.01
...

data 0.02
number 0.02
computer 0.01
...

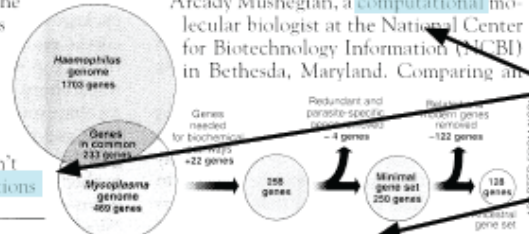
Documents

Seeking Life's Bare (Genetic) Necessities

COLD SPRING HARBOR, NEW YORK—How many **genes** does an **organism** need to **survive**? Last week at the genome meeting here,* two genome researchers with radically different approaches presented complementary views of the basic genes needed for **life**. One research team, using **computer** analyses to compare known **genomes**, concluded that today's **organisms** can be sustained with just 250 genes, and that the earliest life forms required a mere 128 **genes**. The other researcher mapped genes in a simple parasite and estimated that for this organism, 800 genes are plenty to do the job—but that anything short of 100 wouldn't be enough.

Although the numbers don't match precisely, those **predictions**

"are not all that far apart," especially in comparison to the 75,000 **genes** in the human genome, notes Siv Andersson of Uppsala University in Sweden, who arrived at the 800 number. But coming up with a consensus answer may be more than just a **genetic** numbers game, particularly as more and more **genomes** are completely mapped and sequenced. "It may be a way of organizing any newly **sequenced genome**," explains Arcady Mushegian, a **computational** molecular biologist at the National Center for Biotechnology Information (NCBI) in Bethesda, Maryland. Comparing an

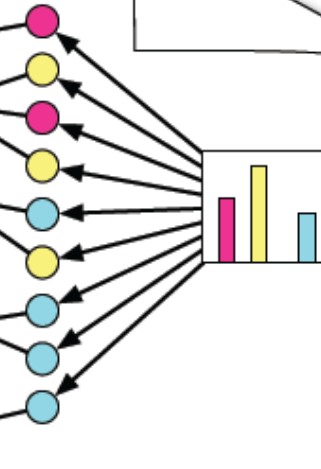


* Genome Mapping and Sequencing, Cold Spring Harbor, New York, May 8 to 12.

Stripping down. Computer analysis yields an estimate of the minimum modern and ancient genomes.

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Topic proportions and assignments



Industrial Robots



[KUKA Roboter GmbH](#), Germany

Service Robots



Asimo, Honda

AI applications

- Autonomous cars
- Intelligent refrigerators
- Intelligent pizza
- Robots that learn from being shown the movements
- AIs creating films, pictures, music
- Robots that sew
- Robots that cook
- Intelligent weapons
- Recommender systems
- AI in military defense
- AI in education
- AI in healthcare
- Robots in bloodstreams
- Ambient Intelligence
- Smart homes
- AI playing games
- Precision agriculture
- AI monitoring animals
- ...