AI PARENTS DAY 2021

BOOKLET

CognAC

HELLO THERE

This booklet was created to provide parents of our AI students with an overview of what the parentsday will entail, what AI is all about, what CognAC is, and more! Feel free to just read through it back to back or skip to the topics that you are interested in. Either way, we hope this booklet will be of use to you.

Have fun and we hope to see you soon!

The Parentsday Committee of SV CognAC

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PREFACE

PARENTSDAY COMMITTEE

Each year, the Parentsday Committee of CognAC (the study association for AI students at Radboud), PC for short, organises a day where students can bring their parents and introduce them to their studies, student life, and Nijmegen. We have lectures from teachers who have taught the students about subjects that the students are familiar with. Even though we try to keep them as basic as possible, it is mostly fun to see students explain the content to their parents! Besides this, parents are able to join discussions, puzzles, exercise, and even games together with their child(ren)! Think about brain teasers, programming, and water pong.

Sadly, this year is a bit different than usual. However, we have tried to still organise a fun, educational, and interesting day for all parents and their child(ren)! Read ahead to find out more about the program of the day, but also for more info about student life in Nijmegen (and even some puzzles!).

Best,
Lea Nugteren
Chair of the PC

THE BOARD OF COGNAC

Hi everyone!

Today, you will be able to get a small insight in the student-life of your child. Being a student is so much more than 'just' studying. It often also means living on your own, meeting a lot of new people, and doing a lot of other activities. For most AI students, it also means becoming a member of CognAC, the study association for all AI students at Radboud University. By being a member, you can join all our great activities, and make use of the services we offer. You can also step up your game, and organise things yourself, by being in one of our many committees. This way, you get to learn a lot of skills you wouldn't necessarily learn in the lecture halls.

This year, we have proven that you can organise great things, even online. We have shown a lot of creativity: from organising pubquizes, to online crash courses. And from online beer pong, to organising this online Parents Day. We hope you have a lot of fun and learn something new about our study programme, the university, and of course about our study association CognAC.

Best,
The board of CognAC

SCHEDULE OF THE DAY

DUTCH TRACK

- **Walk-in**
  13:15 - 13:30
- **Introduction**
  13:30 - 13:45
- **Lecture by Luc Selen**
  13:45 - 14:15
- **Activity**
  14:15 - 15:00
- **Break**
  15:00 - 15:15
- **Lecture by Pim Haselager**
  15:15 - 15:45
- **End**
  15:45 - 16:30

ZOOM LINK

ENGLISH TRACK

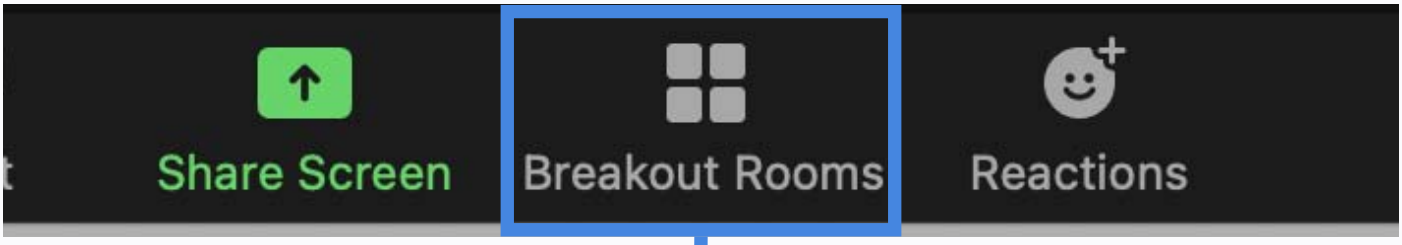
- **Walk-in**
  13:15 - 13:30
- **Introduction**
  13:30 - 13:45
- **Lecture by ...**
  13:45 - 14:15
- **Activity**
  14:15 - 15:00
- **Break**
  15:00 - 15:15
- **Lecture by Giulio Mecacci**
  15:15 - 15:45
- **End**
  15:45 - 16:30

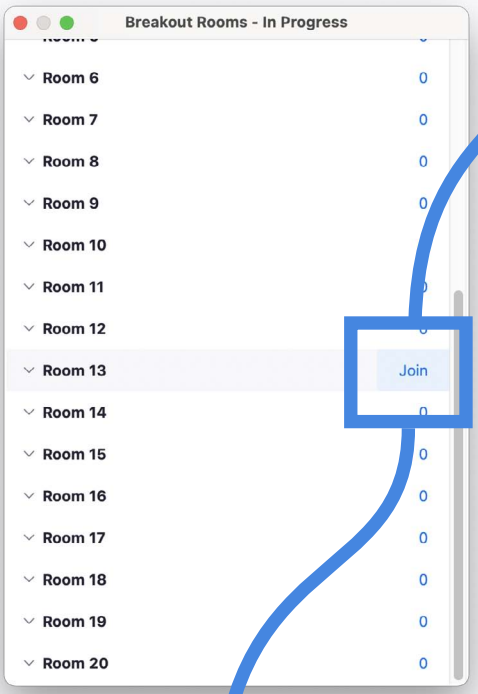
ZOOM LINK

HOW TO JOIN A BREAKOUT ROOM

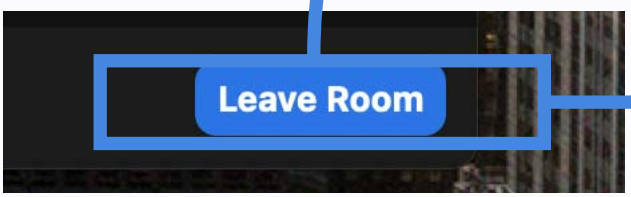
For the activity during the day, we will be using break out rooms for the teams. You will be assigned a group number by e-mail on Friday the 9th of April. Below you will find a short explanation of how to join a breakout room in Zoom.

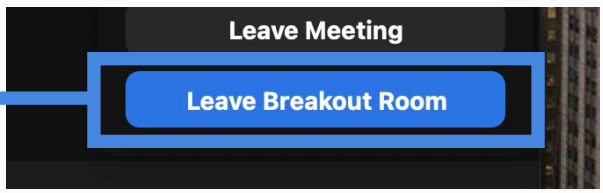
1 Click on the breakout rooms icon.





2 Find your group number and join the room by clicking on the right.





3 After the activity is finished, leave the room and go back to the main zoom. However, do not leave the meeting only the breakout room!

WELCOME TO

... THE AI BACHELOR AT RADBOUD

We used to say that the Artificial Intelligence bachelor was still very new, however, we have already existed since 2003. The study used to be Dutch but became English in 2016-2017. There are a lot of different bodies involved in creating the Artificial Intelligence program. The teachers, the faculty (Social Sciences), the university (Radboud University), but of course most importantly: the students!

The study is perfect for students who are interested in both human cognition and computing science; who would like to unravel human intelligence and recreate it in smart computers and systems; and who like rational and logical reasoning. Maybe this is something you recognize in your child?
Students are introduced to subjects in robotics, computing science, psychology, neuroscience, logic, mathematics, and linguistics (and all of this already in their first year!). After all, they first need to understand how the human brain works before they can start to mimic it in computers and robots. Artificial Intelligence is still an up and coming, young and dynamic field in which there is much to discover. At least, you never have to be worried about your child's future.

After completing a study in AI, students end up in a wide range of sectors, including: education, research, healthcare, telecommunications, ICT, investigations, transport or financial services – basically, wherever there is a need for intelligent systems. Therefore, many of the students are already hired even before graduating!

... STUDY ASSOCIATION COGNAC

The beloved association was founded in 1990 by Cognitive Sciences students. They came up with the name '*Cognitieweten-schappen Activiteiten Commissie*' or 'CognAC' in short! The founders of CognAC had two goals in mind: improve the contact between Cognitive Sciences students and to protect the student interests.

As mentioned above, around 2002/2003 Cognitive Sciences was overhauled and a new study was formed, this new study was Artificial Intelligence. The focus of the study shifted, but the focus of CognAC remained the same, as did the name. In the academic year of 2016-2017 the programme became English and so did the

association. They welcome students from all around the world to join the association, and they want all the students to feel at home in Nijmegen. Throughout the years CognAC grew to become much more than it was initially established for. These days they do not only organize social activities, but also organize activities that help the AI students with career orientation, and their study. These kinds of activities form the core of the association. Even though the association has evolved quite a lot, the goals have always been the same and they hope that the association is a valuable addition to the life of all AI students.

CognAC aims to have a large variety of activities. On one hand, they offer relatively smaller activities such as social drinks, discussion evenings and study workshops for courses. On the other hand, they also organize large activities, for example study trips, symposia and a very large League of Legends tournament. This is however only the tip of the iceberg and they offer much more for all their members to enjoy!

Of course, the association does not run by itself. For this they have a board and many committees, all filled up by enthusiastic members of the association that want to contribute to CognAC. At the top of the association is the board. Every year a new board is formed of 6 members from the association that very actively want to contribute to the association. Nearly all activities are organized by committees. CognAC has a wide variety of them: from the Activities Committee that organizes social activities and the Study Committee that organizes study related activities to the Travel Committee that organizes the bi-yearly study trip and the Parentsday Committee that organises the parentsday.

...THE BEAUTIFUL CITY OF NIJMEGEN

Welcome to Nijmegen, which, with its 176.731 inhabitants, is the tenth largest city of the Netherlands. It is also the largest city in the Eastern part of the Netherlands, as well as one of the oldest cities of the country. Some would argue it is actually the oldest city of the Netherlands.

Nijmegen has been part of the Roman empire. The city's name has been derived from its old Roman name Noviomagus, which means new market. Although not everything from this era has been preserved, quite some ancient traces can still be found in and around the city center. Not all of them are from the Roman era, of course. There is still hundreds of years of history that happened after that time! An example of Roman remains that can be found in Nijmegen is the museum 'De Bastei', which is based on an old Roman foundation that has been built in the second century A.D.

Besides the fact that the Romans have been here in Nijmegen, another large part of Nijmegen's history is World War II. The Germans invaded the city in 1940, after which the people of Nijmegen lived under their occupation until they were finally freed in February 1945. However, before the city was free, it has been bombed by the Allies on February 22nd, 1944.
Plein 1944 ('plein' means square) is one of the newly built parts of the city center, and has been named after the year in which the city was bombed. On the square you can find a war monument in the form of a statue of two soldiers.

Additionally, Nijmegen has beautiful surroundings! Since the city is located towards the South-East- ern part of the country, you can even find some hills here and there. In July, we have the famous Vierdaagse (Four Day Marches) happening in Nijmegen each year. If you are more party animal than four-day-marcher, you can opt to visit the 'Vierdaagse-feesten' in the city center instead. During the week in which Four Day Marches take place, the city center transforms into a festival terrain and is guaranteed to be the most awesome party of the year!
However, you don't have to walk 40 or 50 kilometers each day for four days in a row in order to enjoy Nijmegen's surroundings. You don't even necessarily have to walk!

TURNING ARTICLES

Turning Magazine started by a group of AI-students doing their Bachelors/Masters in Nijmegen. Many of them also once visited the parentsday with their parents. Turning provides a platform of education and information for all people interested in AI through approachable articles. Turning is a fully student-organized magazine targeting AI students and anyone interested in the field of AI.

SAVING THE RAINFOREST WITH AI

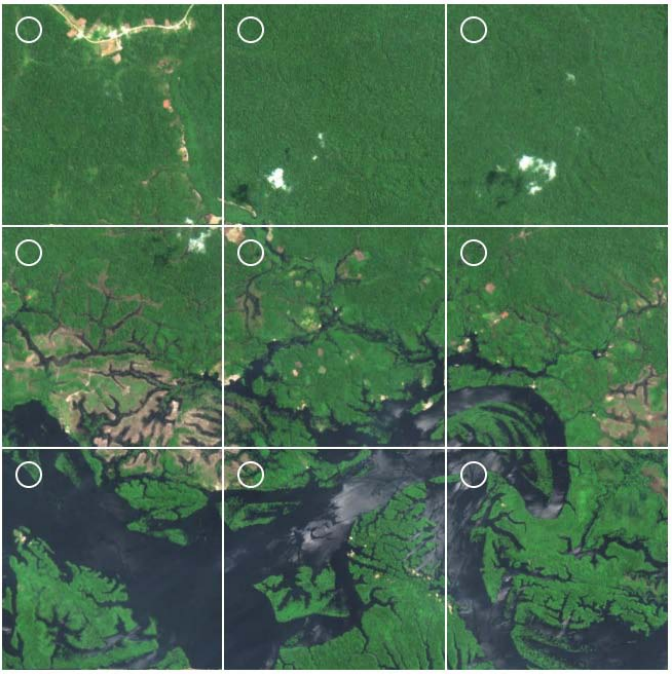
How you and I can help train a model that detects deforestation

Denise van Baalen – graduated AI BSc at RU

Large parts of the Amazon rainforest disappear every year. Although sometimes there are natural reasons why a part of rainforest isn't covered in trees, forest is increasingly being destroyed by people for economic purposes. But how do you find the earliest traces of deforestation in an area larger than the European Union, and how do you find them in time to act and prevent the worst damage? Where humans' capacity to cover such huge areas falls short, AI can be the answer.

The Amazon rainforest is home to many species of animals and plants that are found nowhere else and is one of the places with the highest biodiversity on the planet. Moreover, it is also a gigantic storage of carbon that in times of climate change is especially crucial, and it is the ancient home to tribes to indigenous people. Unfortunately, more and more forest is being illegally cleared every year to make room for grazing lands, farming (primarily for livestock feed), and other economic activity. There is increasing time pressure to protect the forest that is left before the rainforest ecosystem can no longer sustain itself, and the Amazon as we know it may disappear forever. Many efforts are already in place to try to halt deforestation, but the Amazon is incredibly vast. Finding and stopping illegal forest clearing is a near impossible task if you don't know where to look. That is why satellite data is used to find where the forest is disappearing. The tricky part here is that, although clearly visible, a cleared area is tiny on the massive scale of the Amazon rainforest. That is where AI can help.

SAS (a large analytics company) and IIASA (an international research institute that informs policy makers on large pressing topics) decided to join forces to make such an AI a reality. Together, they are developing a model that can judge whether or not a particular area of rainforest shows signs of human impact. It turned out, however, that this task was harder for the AI than was anticipated, as its confidence in its classifications wasn't high originally. That's why they decided to take on a large-scale supervised learning approach, where the model is trained on huge amounts of labelled data. As you might already know, however, labelled data is very labor intensive to collect. That is where we come in. SAS and IIASA turned to crowdsourcing to collect



their labelled data. Using a simple online tool, people like you and me can help to indicate for certain small snippets of rainforest whether or not human impact is visible. It is as simple as clicking the parts of the image where you can see human intervention. Their website provides several examples to help you recognize the difference between natural and man-made disruptions in the landscape, a pattern we as humans can learn incredibly quickly, so that we can better train the model. In the end, the AI will grow more confident about its decisions the more people agree on what areas with and without human intervention look like. Once the AI performs well enough, it can be deployed on a much larger scale. Then, it will be able to judge massive areas of rainforest in only a fraction of a time it would take a human, and it will be able to alert policymakers and those who protect the rainforest immediately when new human activity is detected.

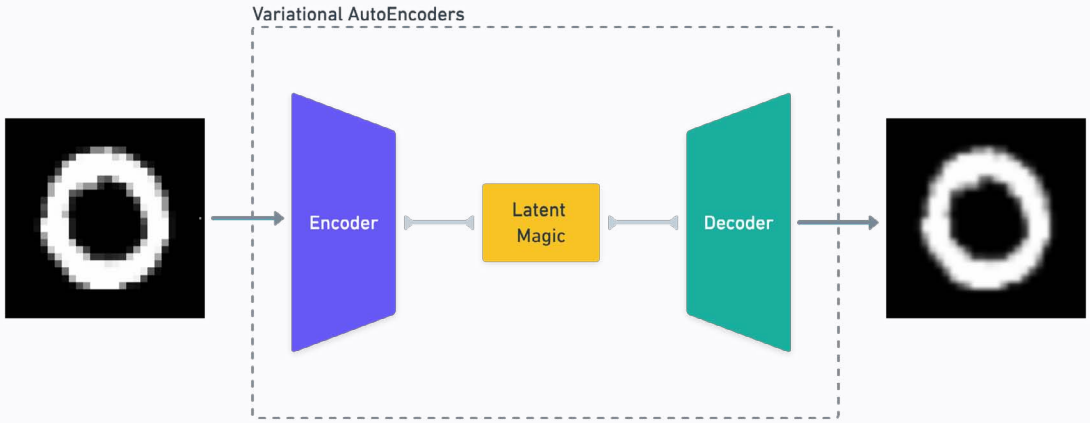
Although technology and nature are often presented as opposites, initiatives like this show that it doesn't always have to be the case. When we teach the technology to find human caused deforestation, the technology can teach us where it is happening right now, so that we can act on it faster than ever before. At the time of writing, you can still help train the model by visiting *https://app.gatheriq.analytics/rainforest* and contribute to this wonderful and important project.

UNDERSTANDING DEEPFAKES

Ajinkya Indulkar – Master's student AI at RU & Machine learning intern @ Sensity

In 2019, over 14,000 videos on the internet were identified as **DeepFakes** and in December 2020, this number skyrocketed to nearly 85,000. Starting out as a niche technology and used by only AI researchers and tech hobbyists, Deepfakes have slowly gained viral popularity in the internet community. With new techniques outperforming the ones that came before, it's clear that this mysterious technology is here to stay. Now, whether it's for the good of humanity or otherwise, that's still up for debate. Some say that ignorance is bliss, but not when it comes to dealing with Deepfakes. To realize the future of Deepfakes, we should learn how this technology came into existence. With the power to question our own eyes and ears, it

is imperative that we understand the potential of this technology - the good and the bad.
Deepfakes are widely recognized as a form of synthetic media created via *Deep Learning*. Deep Learning models are broadly split into two categories: **Discriminative** and **Generative**. While discriminative models learn the distinguishing features of different classes of data, generative models learn the underlying (latent) distribution of data. Cracking the code of this latent information in data is what gave birth to Deepfakes. Although the group of generative models is not small, the credit for creating Deepfakes goes to **Variational AutoEncoders (VAEs)** and **Generative Adversarial Networks (GANs)**. VAEs use an Encoder network to learn the latent distribution of the data it receives and a *Decoder* network to generate the best approximation of the original data based on the learned latent distribution. This approximation improves over multiple training cycles. GANs, on the other hand, are VAEs on steroids. They use an additional discriminative neural network called the *Discriminator* which guides the *Generator (VAE)* network. This results in a far superior approximation of the latent distribution and, in turn, yields better generation results. Given the success of GANs, models like *StyleGAN* are capable of generating high quality face portraits of non-existent (fake) humans.



In the context of synthetic media found on the internet, Rossler et al. (2019)[1] classify Deepfakes into two categories: **Facial Identity Manipulation** and **Facial Expression Manipulation**. Facial identity manipulation, also called *Face Swapping*, transfers the face of a "source" person to a "target" person while maintaining the facial movements of the original target face. Created as an open-source project in 2017, it quickly went viral on Reddit and laid the foundation of the exponential rise in the number of Deepfakes over the internet; a majority of which use the face swapping technology. On the other hand, facial expression manipulation, also called *Facial Reenactment*, retains the face of the "target" person but transfers the facial movements of the "source" person.

In 2020, a mobile app named "Reface App" emerged and commodified face swapping by allowing anyone to create a DeepFake with a few clicks. In the open-source community, a GitHub project named "DeepFaceLab" provides face swapping in the form of software which requires a GPU to create DeepFake videos. Numerous content creators on famous social media platforms like YouTube and TikTok are already using these

services to create Deepfakes in a meme format. Such Deepfakes are fun to watch and really bring out the creativity of the creator. If only we lived in an ideal world.
In 2018, Sensity, an Amsterdam-based visual threat intelligence company, identified that nearly 96% of Deepfakes identified on the internet are pornographic in nature. At the time, the individuals targeted by such Deepfakes were celebrities and public figures. And this trend did not only rise over time but also took a morbid turn. In 2020, Sensity discovered a Telegram bot which synthetically "*strips*" a person in the photograph one would send to the bot, affecting over 100,000 women.

As face swapping has not reached its peak performance, it is still fairly easy to identify such Deepfakes when one pays attention to other visual cues such as the person's voice and context of such a video. But this comes into question with facial reenactment techniques. Deepfakes are created to make it appear that the individual targeted is either doing or saying something, which in reality is untrue. Similar to face swaps, such Deepfakes found on social media platforms are intended to be funny. But those with malicious intent are more than capable of using such technology to defame anyone. Multiple cases have been reported where Deepfakes are used to destabilize governments in developing countries.

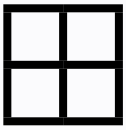
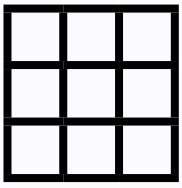
The threat of Deepfakes is very real and authorities are already working on creating laws which can protect citizens against such defamatory attacks. Nonetheless, this should not undermine all the good Deepfakes can do in society. We can use Deepfakes to create multilingual videos with accurate lip-syncing, hyper-realistic virtual avatars for AI-based human assistance, and even accelerate creativity of the film industry by using Deepfakes instead of traditional CGI techniques.

In the end, the potential use of Deepfakes lies in the hands of its user and their intent. Deepfakes can either bring about dystopia, fuelling the era of misinformation and fake news, or bring about utopia, creating a paradigm shift in how artificial intelligence can benefit the world.

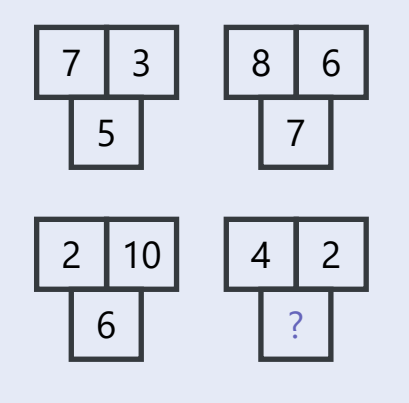
References:
[1] Rossler, A., Cozzolino, D., Verdoliva, L., Riess, C., Thies, J., & Nießner, M. (2019). Faceforensics++: Learning to detect manipulated facial images. In Proceedings of the IEEE/CVF International Conference on Computer Vision (pp. 1-11).

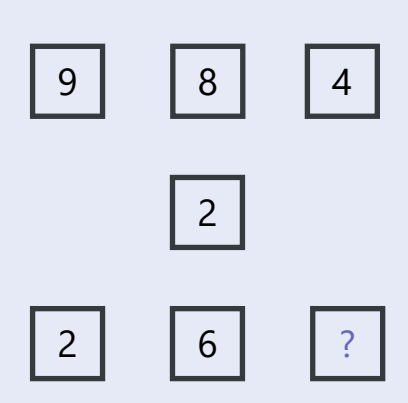
A FEW RIDDLES AND PUZZLES

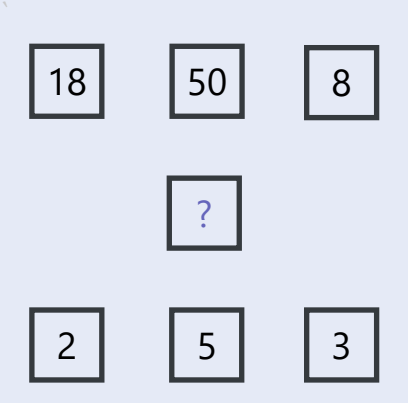
A SUM OF SQUARES

If  = 5 Then...  = ??

WHICH NUMBER REPLACES THE QUESTION MARKS?







EINSTEIN'S RIDDLE

The situation

1. There are 5 houses in five different colors.
2. In each house lives a person with a different nationality.
3. These five owners drink a certain type of beverage, smoke a certain brand of cigar and keep a certain pet.
4. No owners have the same pet, smoke the same brand of cigar or drink the same beverage.

The question is: Who owns the fish?

Hints

- the Brit lives in the red house
- the Swede keeps dogs as pets
- the Dane drinks tea
- the green house is on the left of the white house
- the green house's owner drinks coffee
- the person who smokes Pall Mall rears birds
- the owner of the yellow house smokes Dunhill
- the man living in the center house drinks milk
- the Norwegian lives in the first house
- the man who smokes blends lives next to the one who keeps cats
- the man who keeps horses lives next to the man who smokes Dunhill
- the owner who smokes BlueMaster drinks beer
- the German smokes Prince
- the Norwegian lives next to the blue house
- the man who smokes blend has a neighbor who drinks water