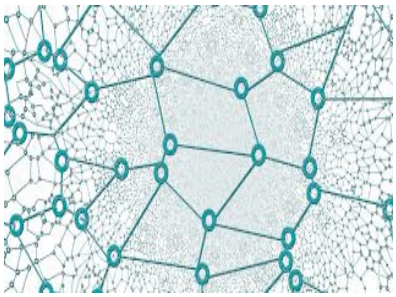
NEURAL NETWORKS & ALL THAT
The New Artificial Intelligence



Frieder Nake
Summer 2019

Outline and conditions for credit

(FN 27 March 2019)

Look at this quote taken from an announcement of Artificial Intelligence (AI) components on the market:

> *Although some so-called AI applications aren't actually cognitive, there are technologies capable of achieving human- or superhuman-level intelligence on given tasks.*
>
> (from announcement of O'Reilly's publication "The New Artificial Intelligence market")

Are we supposed to swallow this? Do you do it? I mean, you are studying at an academic institution, so you may supposedly be scientifically- or artistically-minded. So, maybe, you ...

Here is another question: Do you believe that machines can *learn*? Before you answer, think about how it was when you learned how to ride a bicycle, or how to bind your shoe laces, or when you learned to speak. And how was it when you had to do calculations? How do you do 26 x 73, now, that you are grown up? Do you do it *in* your head?

A study is claimed to have shown that under certain circumstances human beings may be willing to sacrifice other humans' lives in order to save a robot. It seems to be enough to have the robot look a bit like a human.

But you also read this kind of news: "Organizations looking to benefit from the artificial intelligence (AI) revolution should be cautious about putting all their eggs in one basket, a study from the University of Waterloo has found." (Science Daily, Jan. 17, 2019) There seem to be problems in measuring success when machines are supposed to learn. Does this come as a surprise to you?

The really big current hype is, of course, called CNN. Now, as you will know, these three letters do no longer stand for *Cable News Network*, they rather mean *Convolutional Neural Network*. You know what a network is. That's somehow trivial. You know the word "neural" from talks about the brain. Do you know anything about "convolutions"? Maybe only vaguely. But you may, as many of your friends, currently be doing something with those CNNs. Should we try to get behind them, perhaps even try to understand what they are? I suggest, we should do this.

A Challenge Seminar
Summer 2019 | 4 SWS | 6 ECTS | for Master Digital Media (M.A., M.Sc.) | others welcome
Topics in Digital Media | Monday 10-14 at HfK 4.15.070 | **Starts: 15 April 2019 at 10 a.m.**

Frieder Nake | University MZH room 1330 | nake@uni-bremen.de | 218 64485 | Office hours Tuesday 10-12

Therefore, I offer this course. It will be divided up into three parts:

- a short look into the early history of what then came to be called "Artificial Intelligence",
- the main part on neural networks, including a bit of mathematics because, without that, we cannot understand what they are,
- and an outlook on aspects of what is now considered to be, or at least is subsumed under, the name of "Artificial Intelligence": machine learning, big data, "4.0".

Our approach will be critical and skeptical, historical and systematic. We should not jump onto the band waggon of digitization, rather try to learn what it means to turn activities, that humans do intuitively and skillfully, into computable functions. A main *goal* of our efforts should be to keep our great human capability of mistrusting the great promises of advanced technology (or of the people behind that), and rather acknowledge the fact that our lives are finite. Human life always happens against the horizon of death. That's also the horizon of human intelligence which is always historically and culturally determined.

Concerning Credit Points

You may gain credit points (6 of them) for always actively taking part in our efforts. Specifically, I ask you to accompany the course by a trace you create and that you lead up to some work of your choice. More concretely,

- you should keep a book of your studies during the entire length of the course,
- and you should create a work of your choice.

Week by week you write into your study book your observations, your thoughts, your questions, discoveries, reading achievements, critique, whatever comes to your mind and is, in your opinion, worth to be kept.

And you lead your thoughts up to a work that you create in the end. It is supposed to express something you take from what we did during the course. It may take the form of an image, a musical composition, a short video, an essay, an installation of some kind, a collage, a dramatic text, a sculpture, a website, a proposal for research, ... No limitations are given to the form of that work. The only condition relates to your topic: it should be related to what we did during the term.

I hope we can have an extra closing meeting (whose date we still have to set) where you will present your works and we will discuss it. Once this is done, we all drink a glass of water or champagne.

Plan of the Semester

Because of two Monday holidays in Germany and the trouble with the differing beginnings at HfK and University, we cannot start before the 15th of April. And even this is problematic. For, as I hear, the University calls for Easter holidays. We *must* ignore this. There will only be eleven meetings. Do you like this? I don't.

date	*topic*
15 April 2019	Who is coming? What are you expecting? What do we know about "CNN"? What have we heard of Artificial Intelligence? – And then: The idea and the plan for the term.
22 April 2019	--- holiday! ---
29 April 2019	Traditional Artificial "Intelligence" 1
6 May 2019	Traditional Artificial "Intelligence" 2
13 May 2019	Neural Networks 1
20 May 2019	Neural Networks 2
27 May 2019	Neural Networks 3
3 June 2019	Neural Networks 4
10 June 2019	--- holiday ---
17 June 2019	Neural Networks 5
24 June 2019	New Artificial "Intelligence": Machine Learning
1 July 2019	New Artificial "Intelligence": Big Data
8 July 2019	New Artificial "Intelligence": The label "4.0"
--still open date--	The results of your work: a day of presentation and discussion