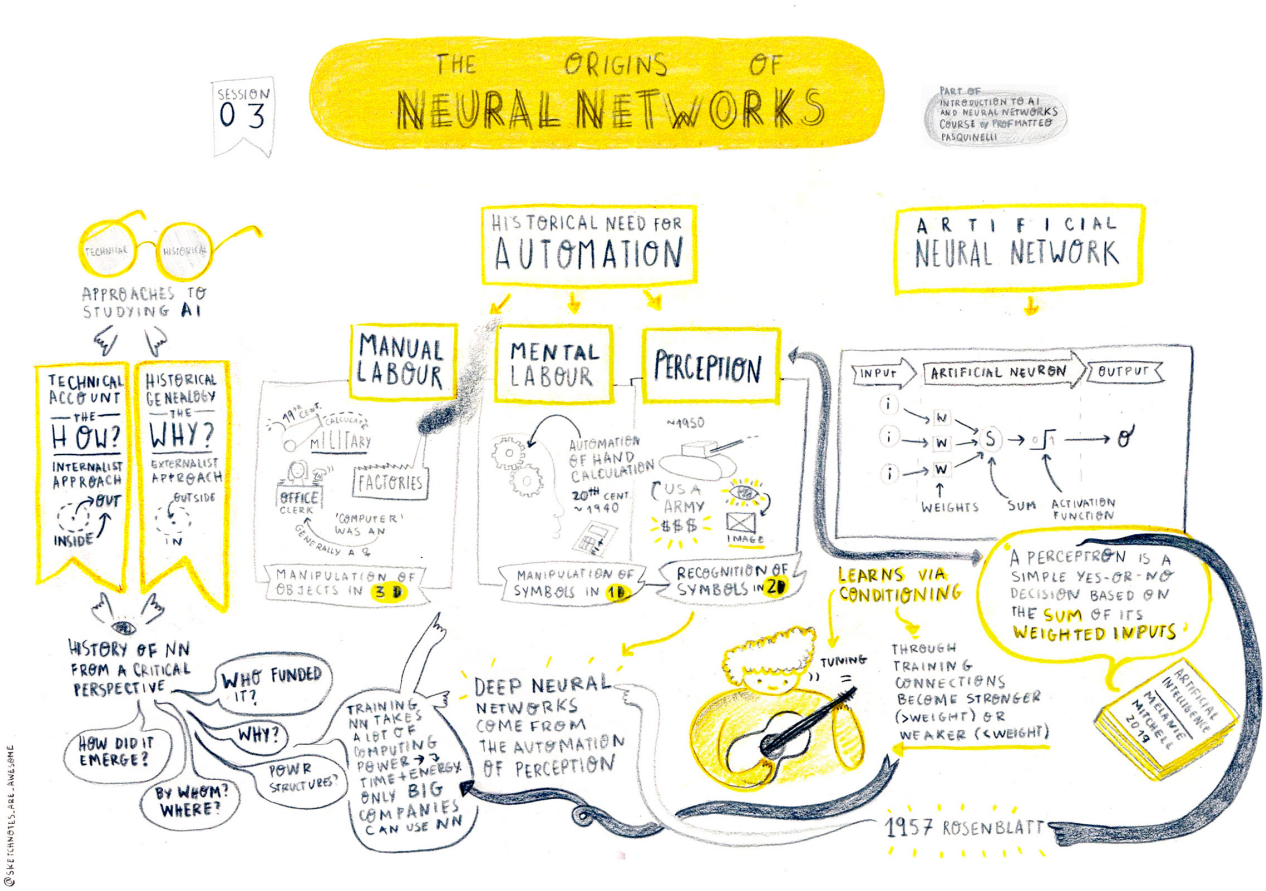
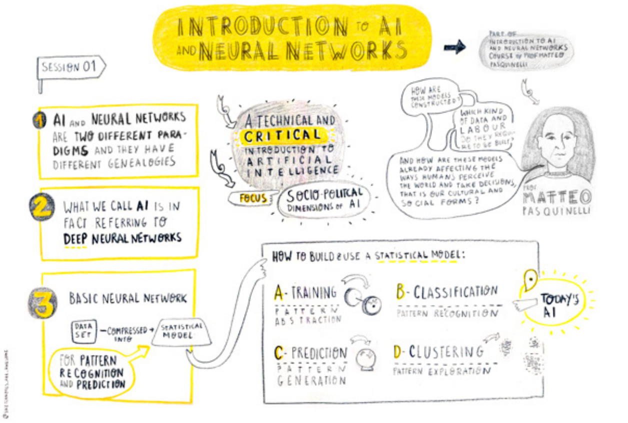
Elvia Vasconcelos
A visual introduction to AI

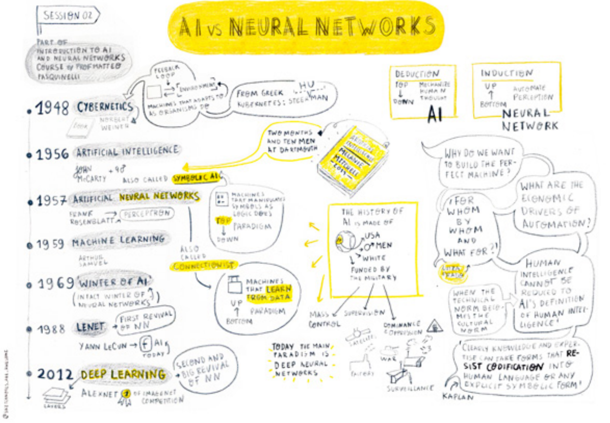


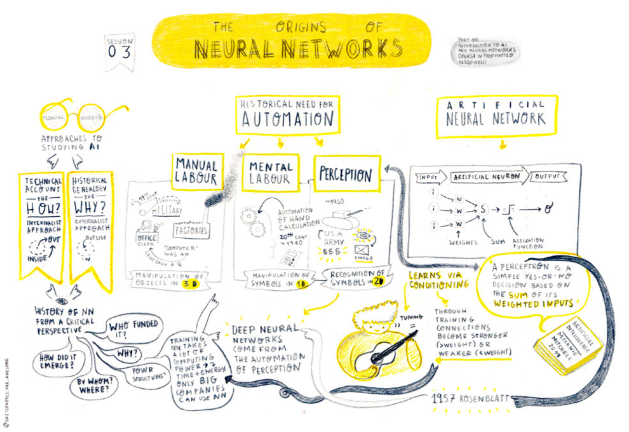
'A visual introduction to AI' is a collection of sketches that document the key messages coming from the online course 'Introduction to AI and Neural Networks' held in the summer of 2020 at Karlsruhe University of Arts and Design. They are the result of an ongoing exchange between design researcher and sketchnoter Elvia Vasconcelos, who was invited to attend the course by Prof. Matteo Pasquinelli.

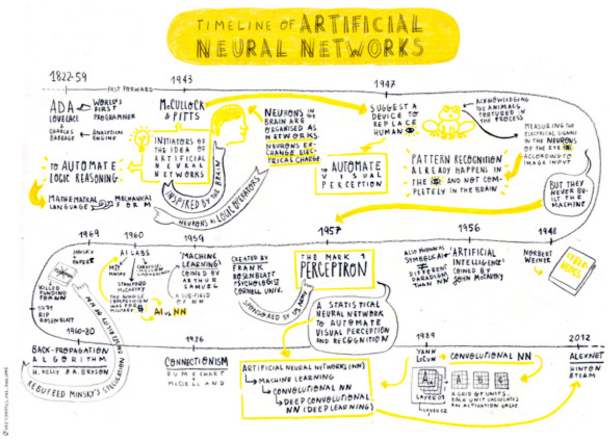
The sketches are intended as accessible maps to help students familiarise themselves with the history of AI and the basic components of the complex architecture of artificial neural networks.

In her work, Vasconcelos has been using sketchnotes – a form of visual note-taking that combines words with simple drawings – to map information and tell stories in accessible and engaging ways. These sketches act as conversation sites that in the to and fro between people create a common ground on which to create shared meaning. Done collectively, they emerge from a continuous process of listening and exchange, where we negotiate our understanding of things together.

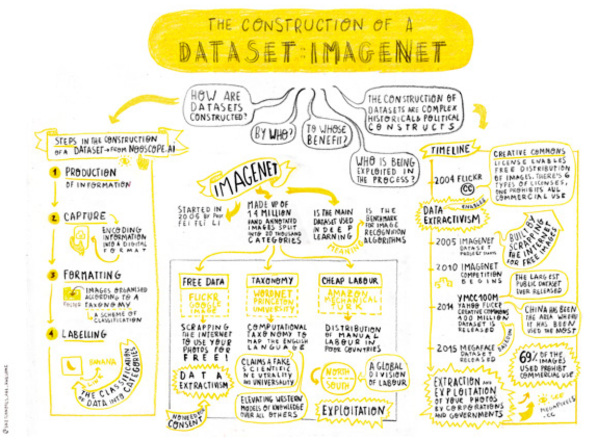

INTRODUCTION TO AI AND NEURAL NETWORKS
SESSION 01
PART OF INTRODUCTION TO AI AND NEURAL NETWORKS COURSE BY PROF MATTEO PASQUINELLI
1 AI AND NEURAL NETWORKS ARE TWO DIFFERENT PARADIGMS AND THEY HAVE DIFFERENT GENEALOGIES
2 WHAT WE CALL AI IS IN FACT REFERRING TO DEEP NEURAL NETWORKS
3 BASIC NEURAL NETWORK
DATA SET — COMPRESSED INTO — STATISTICAL MODEL
FOR PATTERN RECOGNITION AND PREDICTION
A TECHNICAL AND CRITICAL INTRODUCTION TO ARTIFICIAL INTELLIGENCE
FOCUS
SOCIO-POLITICAL DIMENSIONS OF AI
HOW ARE THESE MODELS CONSTRUCTED?
WHICH KIND OF DATA AND LABOUR DO THEY REQUIRE TO BE BUILT?
AND HOW ARE THESE MODELS ALREADY AFFECTING THE WAYS HUMANS PERCEIVE THE WORLD AND TAKE DECISIONS, THAT IS OUR CULTURAL AND SOCIAL FORMS?
PROF MATTEO PASQUINELLI
HOW TO BUILD & USE A STATISTICAL MODEL:
A- TRAINING
PATTERN ABSTRACTION
B- CLASSIFICATION
PATTERN RECOGNITION
C- PREDICTION
PATTERN GENERATION
D- CLUSTERING
PATTERN EXPLORATION
TODAY'S AI


SESSION 02
AI VS NEURAL NETWORKS
PART OF INTRODUCTION TO AI AND NEURAL NETWORKS COURSE BY PROF MATTEO PASQUINELLI
1948 CYBERNETICS
NORBERT WIENER
1956 ARTIFICIAL INTELLIGENCE
JOHN MCCARTHY
ALSO CALLED SYMBOLIC AI
1957 ARTIFICIAL NEURAL NETWORKS
FRANK ROSENBLATT
PERCEPTRON
1959 MACHINE LEARNING
ARTHUR SAMUEL
ALSO CALLED CONNECTIONISM
1969 WINTER OF AI
1988 LENET
YANN LECUN
2012 DEEP LEARNING
ALEXNET
SECOND AND BIG REVIVAL OF NN
TODAY THE MAIN PARADIGM IS DEEP NEURAL NETWORKS
DEDUCTION
TOP DOWN
AI
INDUCTION
BOTTOM UP
NEURAL NETWORK
WHY DO WE WANT TO BUILD THE PERFECT MACHINE?
FOR WHOM BY WHOM AND WHAT FOR?
WHAT ARE THE ECONOMIC DRIVERS OF AUTOMATION?
HUMAN INTELLIGENCE CANNOT BE REDUCED TO AI'S DEFINITION OF HUMAN INTELLIGENCE
THE HISTORY OF AI IS MADE OF USA MEN WHITE FUNDED BY THE MILITARY
MASS CONTROL
SURVEILLANCE
KAPLAN


SESSION 03
THE ORIGINS OF NEURAL NETWORKS
PART OF INTRODUCTION TO AI AND NEURAL NETWORKS COURSE BY PROF MATTEO PASQUINELLI
APPROACHES TO STUDYING AI
TECHNICAL ACCOUNT THE HOW?
HISTORICAL GENEALOGY THE WHY?
HISTORICAL NEED FOR AUTOMATION
MANUAL LABOUR
MENTAL LABOUR
PERCEPTION
ARTIFICIAL NEURAL NETWORK
INPUT ARTIFICIAL NEURON OUTPUT
WEIGHTS SUM ACTIVATION FUNCTION
HISTORY OF NN FROM A CRITICAL PERSPECTIVE
WHO FUNDED IT?
WHY?
HOW DID IT EMERGE?
BY WHOM? WHERE?
DEEP NEURAL NETWORKS COME FROM THE AUTOMATION OF PERCEPTION
LEARNS VIA CONDITIONING
A PERCEPTRON IS A SIMPLE YES-OR-NO DECISION BASED ON THE SUM OF ITS WEIGHTED INPUTS
1957 ROSENBLATT


TIMELINE OF ARTIFICIAL NEURAL NETWORKS
1822-59
ADA LOVELACE
CHARLES BABBAGE
1943
MCCULLOCK & PITTS
1947
TO AUTOMATE LOGIC REASONING
AUTOMATE VISUAL PERCEPTION
PATTERN RECOGNITION
1969
1960
1959
1957
THE MARK 1 PERCEPTRON
1956
ARTIFICIAL INTELLIGENCE
1948
NORBERT WIENER
1960-80
BACK-PROPAGATION ALGORITHM
1986
CONNECTIONISM
1989
YANN LECUN
CONVOLUTIONAL NN
2012
ALEXNET
HINTON


WHAT IS A DATASET?
1 COLLECTION OF IMAGES
IS A COLLECTION OF IMAGES WITH ADDED INFORMATION ORGANISED BY TAXONOMIES
IS A POLITICAL AND SOCIAL CONSTRUCT
3 TAXONOMIES
ALL TAXONOMIES ARE POLITICAL
2 CLASSIFICATION
WHOSE VISION OF THE WORLD IS BEING ELEVATED IN THE CONSTRUCTION OF A DATASET?
WHO IS BEING EXPLOITED IN THE PROCESS?
WHO GETS TO DECIDE?
WHAT HIERARCHICAL FORMATIONS ARE BEING CREATED?
DATA IS NEVER NEUTRAL
HUMAN CONSTRUCT
HIERARCHICAL FORMATIONS
RIGID & BINARY CLASSIFICATIONS
FORMATIONS OF VALUE
LABELS
RACE
GENDER
SEXUALITY
BANANA


THE CONSTRUCTION OF A DATASET: IMAGENET
HOW ARE DATASETS CONSTRUCTED?
BY WHO?
TO WHOSE BENEFIT?
THE CONSTRUCTION OF DATASETS ARE COMPLEX HISTORICAL & POLITICAL CONSTRUCTS
STEPS IN THE CONSTRUCTION OF A DATASET
1 PRODUCTION OF INFORMATION
2 CAPTURE
3 FORMATTING
4 LABELLING
IMAGENET
STARTED IN 2006 BY FEI FEI LI
WHO IS BEING EXPLOITED IN THE PROCESS?
FREE DATA
TAXONOMY
CHEAP LABOUR
DATA EXTRACTIVISM
A GLOBAL DIVISION OF LABOUR
EXPLOITATION
TIMELINE
2004 FLICKR
2005 IMAGENET
2010 IMAGENET
2014
2015 MEGAFACE
DATA EXTRACTIVISM
EXTRACTION AND EXPLOITATION OF YOUR PHOTOS BY CORPORATIONS AND GOVERNMENTS
CREATIVE COMMONS

1. **A critical approach to the history of Artificial Intelligence**
   The course is framed as a technical and critical introduction to Artificial Intelligence (AI) and Neural Networks (NN) where we look under the hood to see how models are constructed and ask questions such as 'What kind of data and labour do they require?' to explore the socio-political dimensions of AI&NN. In this sketch we learn that AI and NN are two different things, although most of what we call AI today in fact refers to NN.

2. **AI vs Neural networks – genealogy**
   The distinction between the two is explored by looking at the genealogy of both paradigms and its key historical figures (disappointment-alert: they are all white, male and based at a US University).

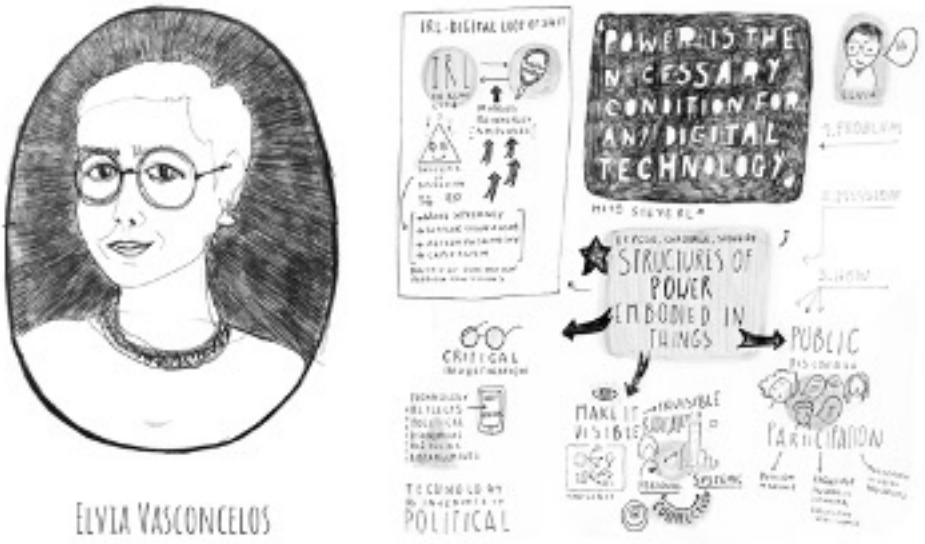
3. **The origins of Neural Networks**
   NN is framed within the historical need for automation of manual labour, mental labour and perception. The basic architecture of an artificial NN is introduced. A distinction is made between two approaches to studying AI&NN:
   - Technical account: the how AI&NN works
   - Historical genealogy: the why that explores the history of AI&NN from a critical perspective by asking: How did it emerge? Who funded it? Where? Why? To whose benefit? And at the cost of whom / what?

4. **Timeline of Artificial Neural Networks**
   An in-depth look at the historical genealogy of Artificial NN, starting with Ada Lovelace and Charles Babbage in 1822.

5. **What is a dataset?**
   Breaks down datasets into three components:
   (1) collection of images; (2) classification; (3) Taxonomies.

   Under the illusion of neutrality (of which there is none), datasets could* be described as collections of images, with added information, organised through taxonomies. Yet they are so much more than that. Datasets are political and social constructs that elevate the vision of those shaping the narratives. These are built on historically rigid and binary classifications that are used to justify formations of value that create hierarchical structures of power. Data is never neutral (nothing is).

6. **The construction of a dataset: Imagenet**
   Taking Imagenet as a case study to understand all the steps involved in creating a dataset.



Elvia Vasconcelos is a design researcher, wannabe activist, compulsive drawer and dressmaker. She is currently a doctoral candidate at the Technical University of Eindhoven, where she is investigating the politics of participation and accessibility. This research takes the notion of participation as 'being together' and explores what being together means in struggle, through a praxis that creates spaces for a multitude of voices and bodies to speak and be heard.

Vasconcelos's design practice deals with the socio-political dimensions of digital technologies. Taking voice technologies as an object to critically explore the field of Artificial Intelligence, she created the 'Feminist Alexa' project in 2017 – a series of workshops that critically look at Personal Intelligent Assistants e.g. Amazon Alexa, to investigate the ways in which gender is used in technology and the connections to gender-based discrimination in real life. Her critical investigations of AI have been articulated in a number of different settings such as in Alexa Diaries, in the Feminist Voices in Tecnology publication and at a number of events such as the Mozilla Festival, The air of turbulence and Primer Conference.

In her critical investigation of AI Vasconcelos has used sketching as a way to render complexity more accessible.