

May 23, 2017

Rob, Ahmet,  
Martin and  
Mike

Why

How  
FFNN

# HACKATHON 8

## Eindhoven Data Science

Rob, Ahmet, Martin and Mike

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May 23, 2017

# Overview

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## 1 Why

## 2 How

- FFNN

# Aim

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## 1 Today

- Explain Neural Networks
- Explain Tensorflow

## 2 Next meetup (20 June)

- Train a convolutional neural network
- Use TensorBoard to visualize a training

# Object detection

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## Faster R-CNN

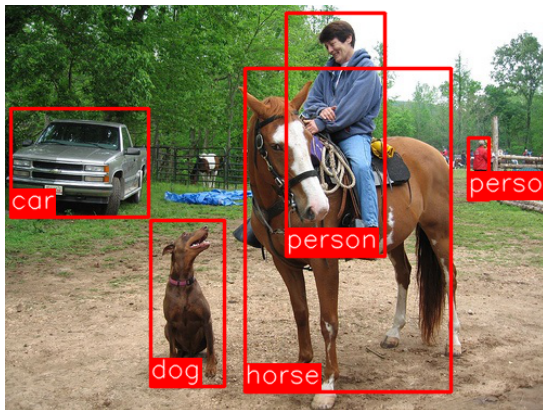


Figure: faster rcnn (image from Github *mitmul*)

# Apple siri

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Siri



Figure: Photo: cultofmac.com

# GMail reply

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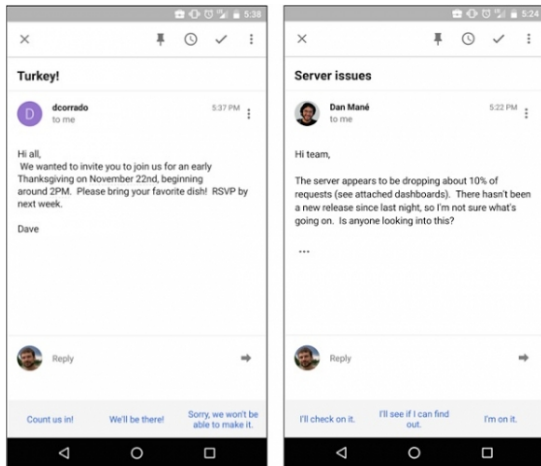


Figure: Photo: Greg Corrado, Google Research Blog

# Segmentation

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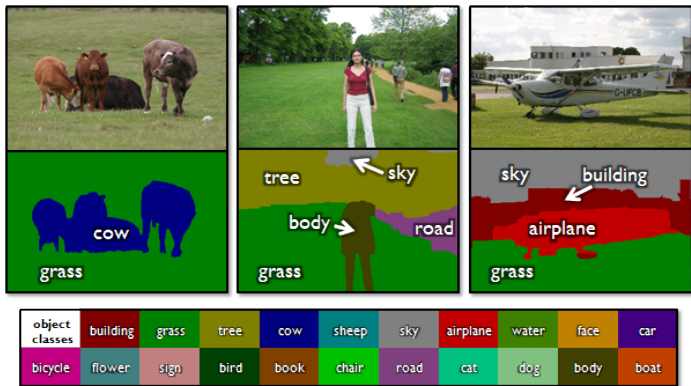


Figure: Semantic Segmentation with CNN (image from jamie.shotton.org)

# Generation

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THE MULTIVERSE —

## Movie written by algorithm turns out to be hilarious and intense

For *Sunspring*'s exclusive debut on Ars, we talked to the filmmakers about collaborating with an AI.

ANNALEE NEWITZ · 6/9/2016, 12:30 PM



*Sunspring*, a short science fiction movie written entirely by AI, debuts exclusively on Ars today.

Figure: <http://arstechnica.com/the-multiverse/2016/06/an-ai-wrote-this-movie-and-its-strangely-moving/>



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# Why not

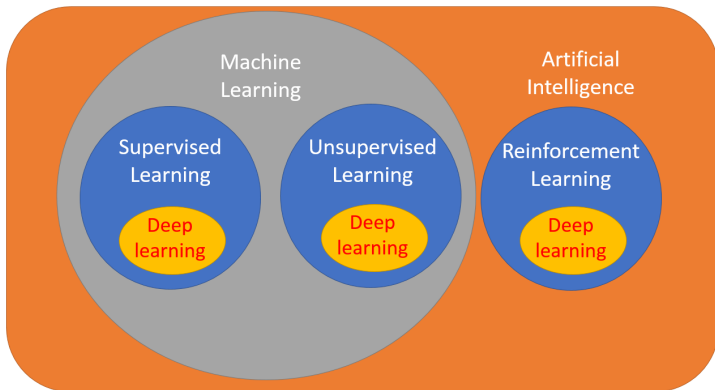
# Overview of the field

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# Which data not

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## 1 YES: media type data

- 1 Text, language, speech
- 2 Images, video, maps
- 3 time-series, stocks, valuta

## 2 NO: categorical data

- 1 Properties of instances
- 2 Features of instances
- 3 Categories of products

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# Neural Networks

# Neural nets

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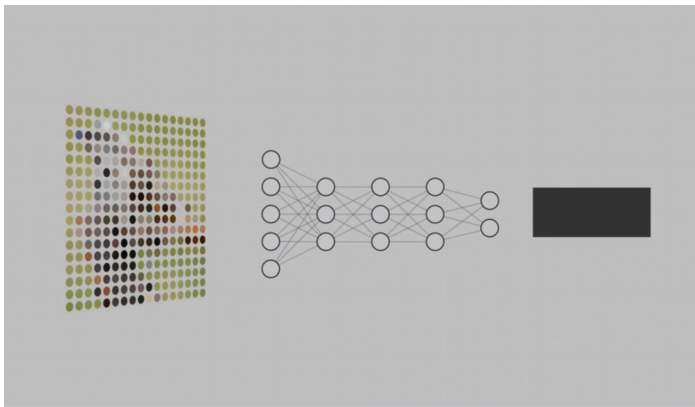


Figure: Neural network explained (credits: Blaise Aguera y Arcas)

# Basic equation

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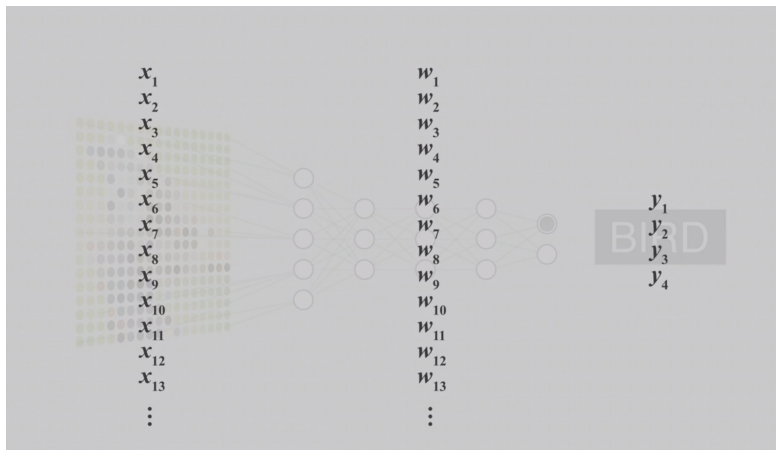


Figure: Neural network explained (credits: Blaise Aguera y Arcas)

# Template equation

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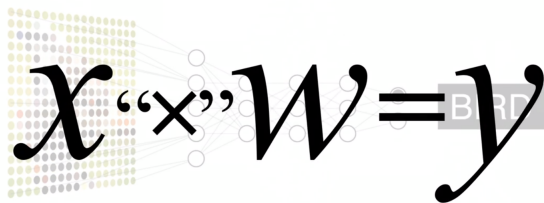


Figure: Template equation neural net (credits: Blaise Aguera y Arcas)

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# How to use weights?



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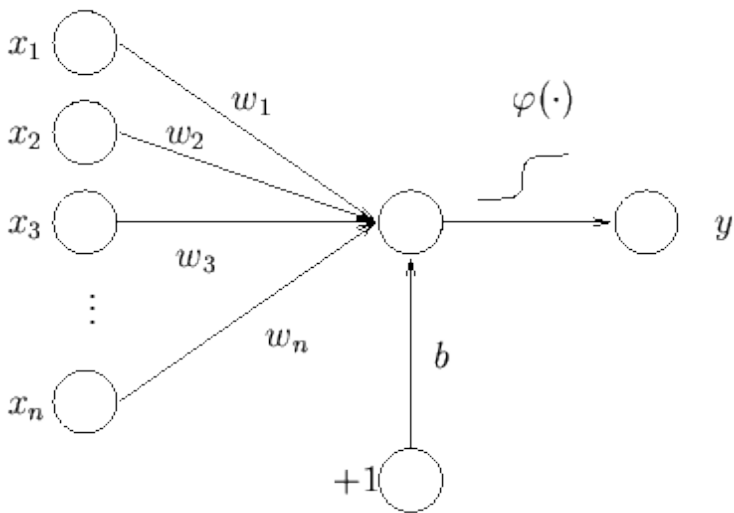
- Email: Spam or not spam?
- Transactions: fraudulent or non-fraudulent?
- Tumor: malignant or benign?

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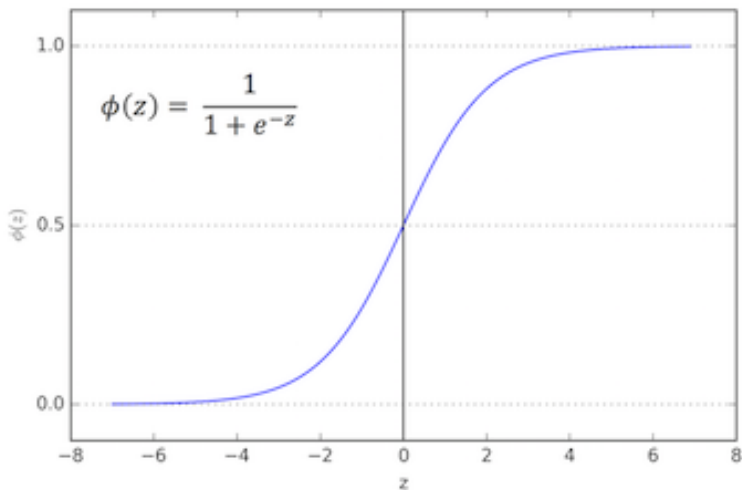
$$output = \begin{pmatrix} feature0 \\ feature1 \\ feature2 \\ feature3 \\ feature4 \end{pmatrix} \begin{pmatrix} 1 \\ input1 \\ input2 \\ input3 \\ input4 \end{pmatrix}$$

# Activation function

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# Tensorflow

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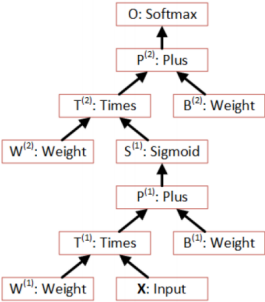
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- Tensorflow
- PyTorch
- Keras
- 
- Caffe, Theano (Lasagne), Torch
- Chainer, DyNet

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- Session: Graphs are constructed and trained within a **session**
- Node: Each computation happens on a *node*
- Tensor: On each edge flows a **tensor**
- Variable: Trainable weights are instances of **Variable**
- Placeholder: One must **feed** data to a **placeholder**
- Fetch: with `sess.run()` one can **fetch** data from the graph



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# Let's get to work!