

# Interacting with Artificial Intelligence

University of Oslo, 2019

Hva skal du gjøre i helgen



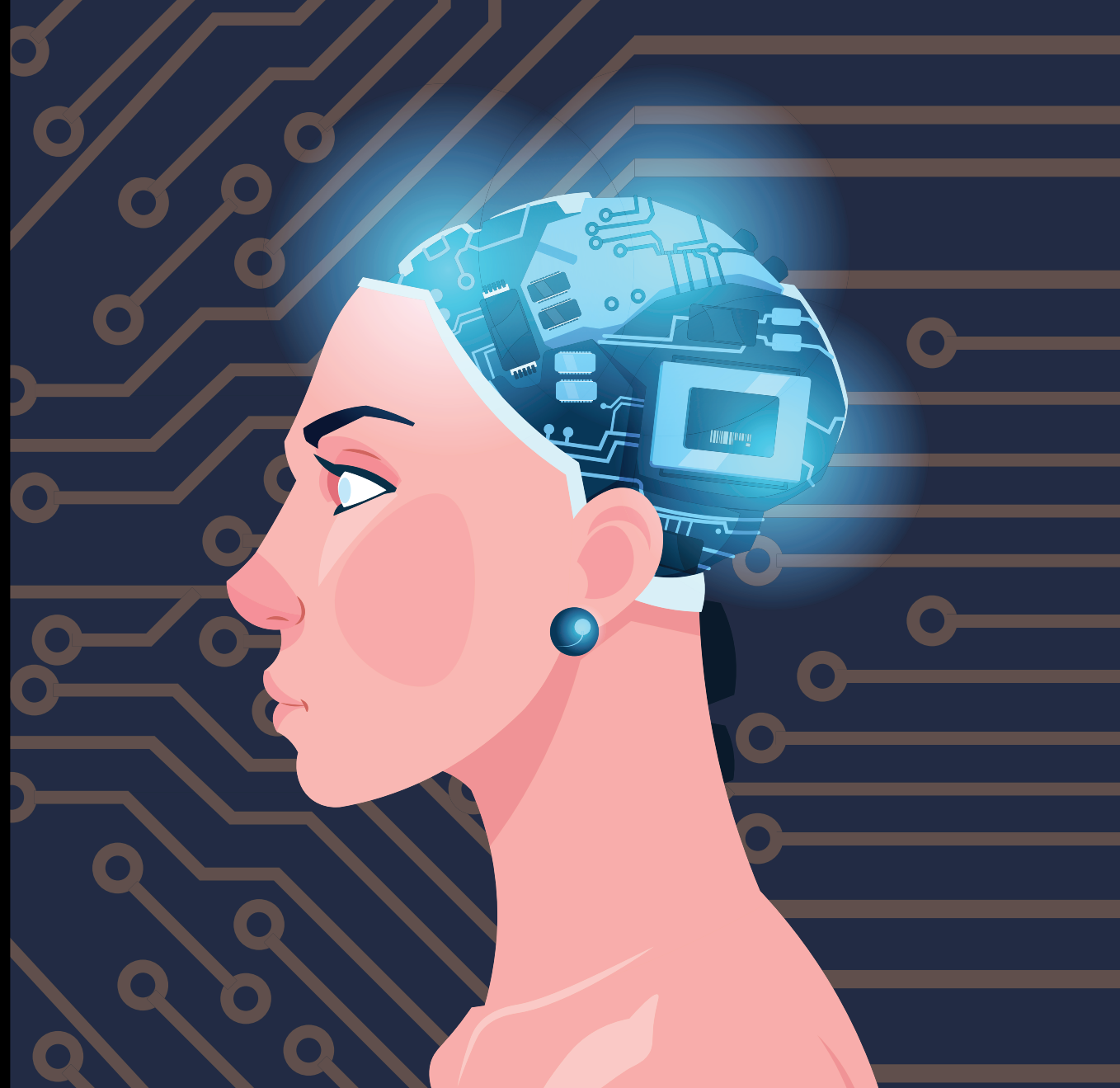
# Agenda

## Day 1:

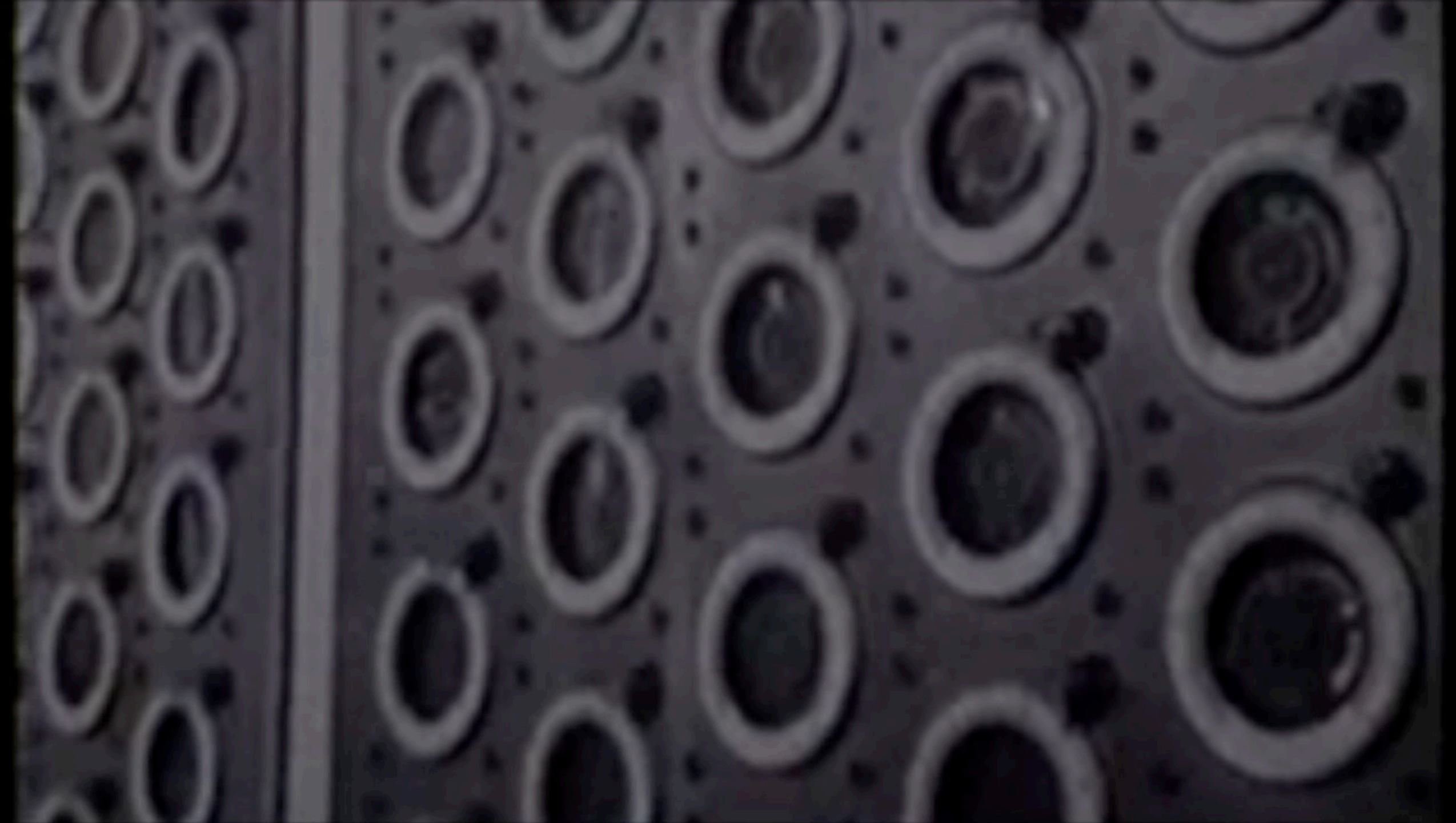
1. Introduction to Artificial Deep Neural Networks
2. Create a classifier
3. Create a AI-based chatbot

## Day 2

1. Present your chatbot
2. Create a generative chatbot

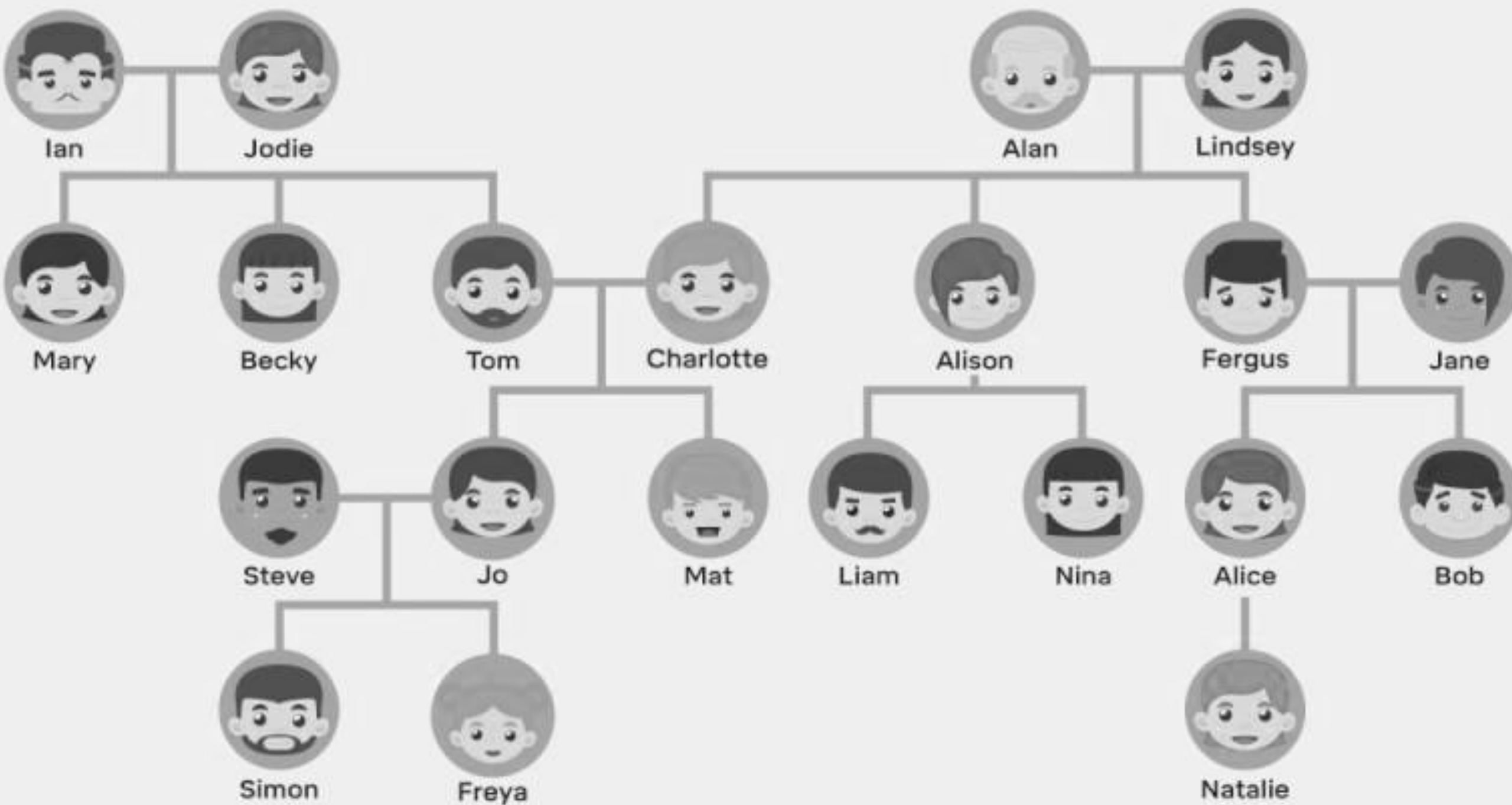






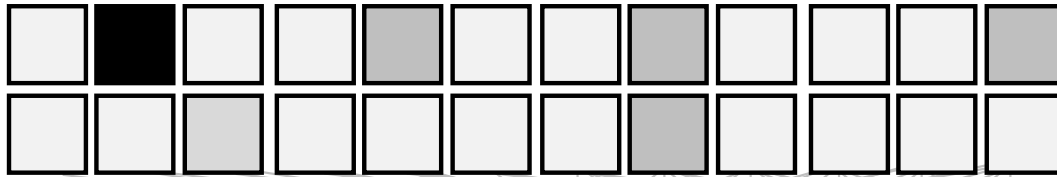








Gruppe med nevroner som representerer slektning



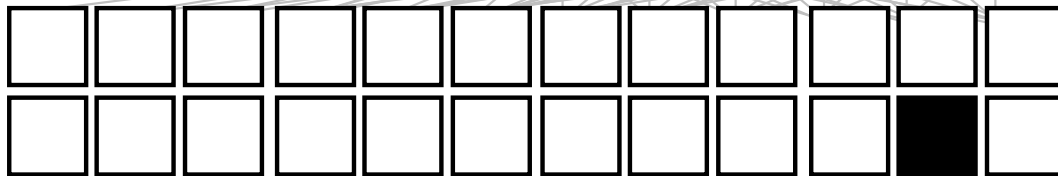
Skjult gruppe med nevroner 3



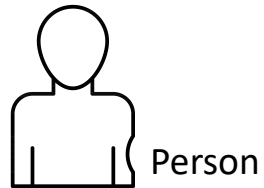
Skjult gruppe med nevroner 2



Skjult gruppe med nevroner 1



Gruppe med nevroner som representerer person og familieforhold



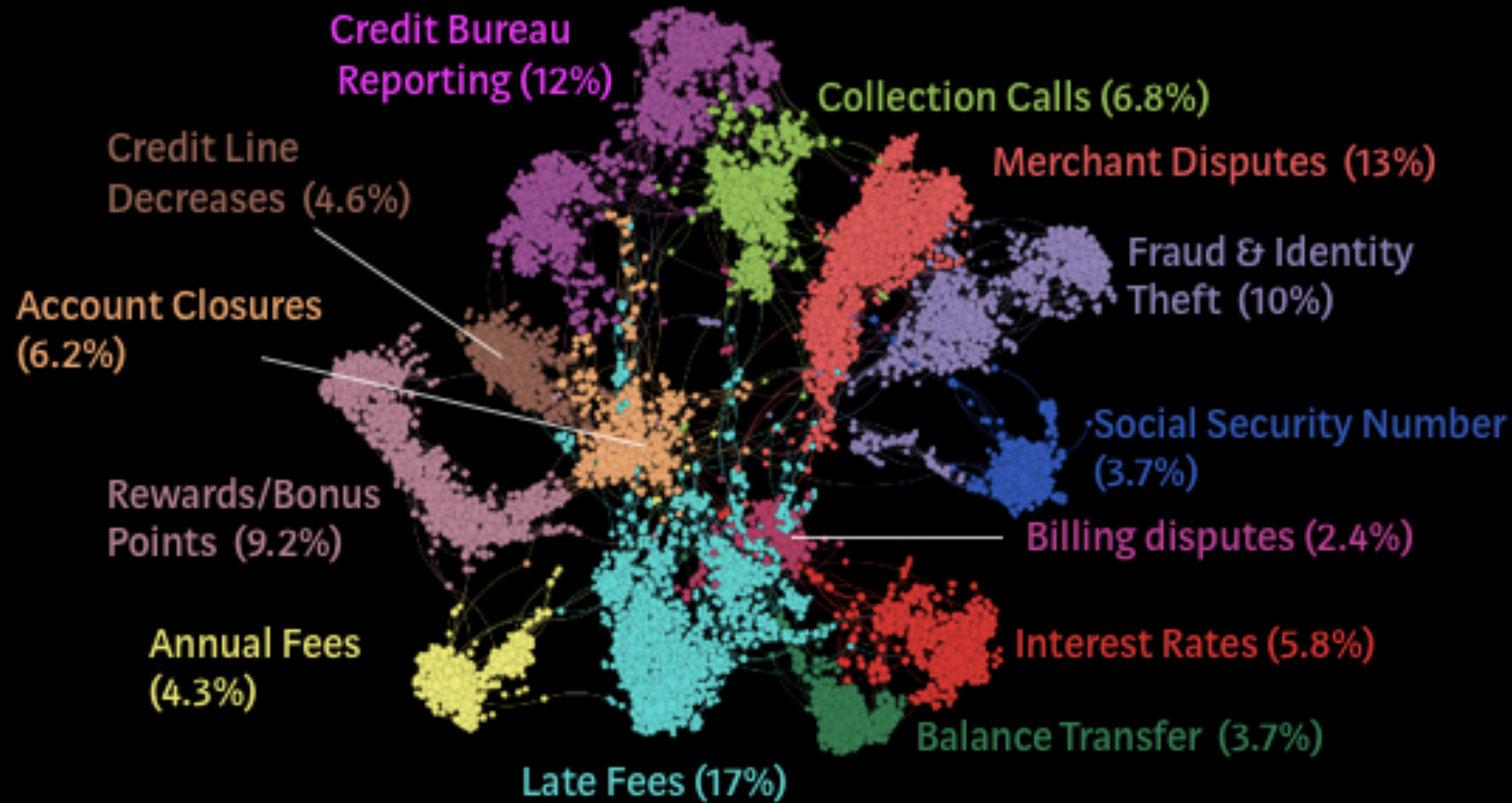


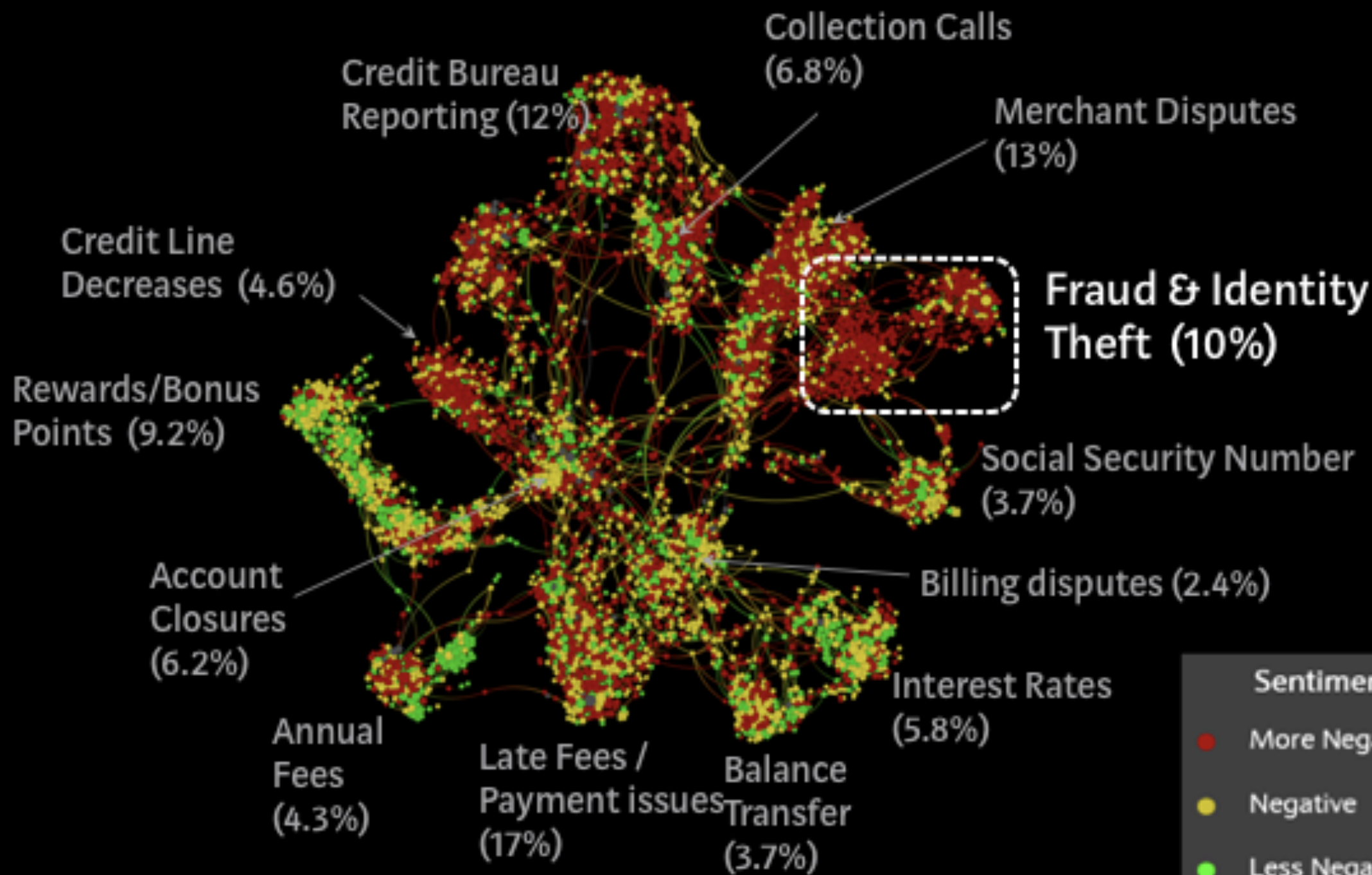
I am not really confident, but I think it's a man sitting next to a table holding a newspaper and he seems happy.

Microsoft Caption Bot



I am not really confident, but I think it's a man taking a selfie in a dark room and he seems very happy.



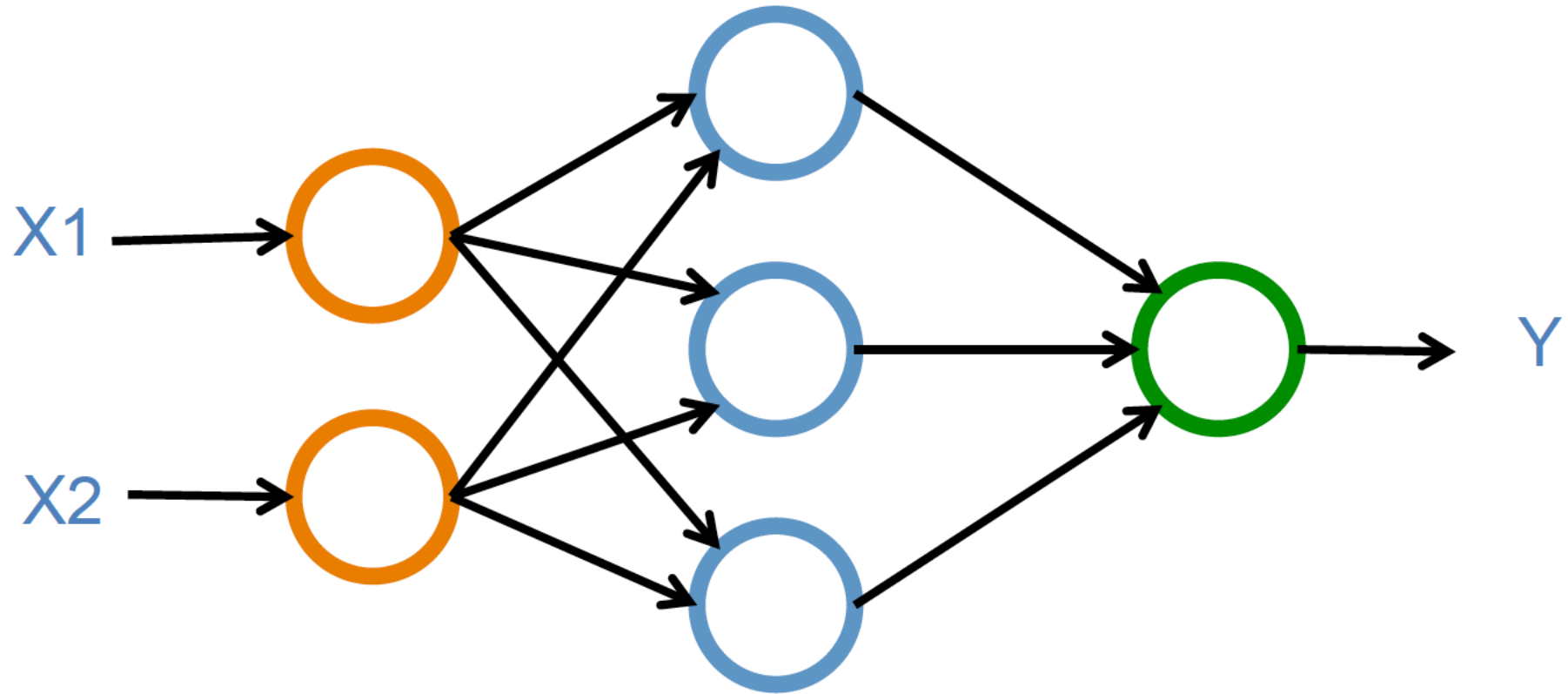


Sentiment Summary	
More Negative	48%
Negative	35%
Less Negative	15%

**Input Layer**  
(X)

**Hidden Layer**  
(H)

**Output Layer**  
(Y)

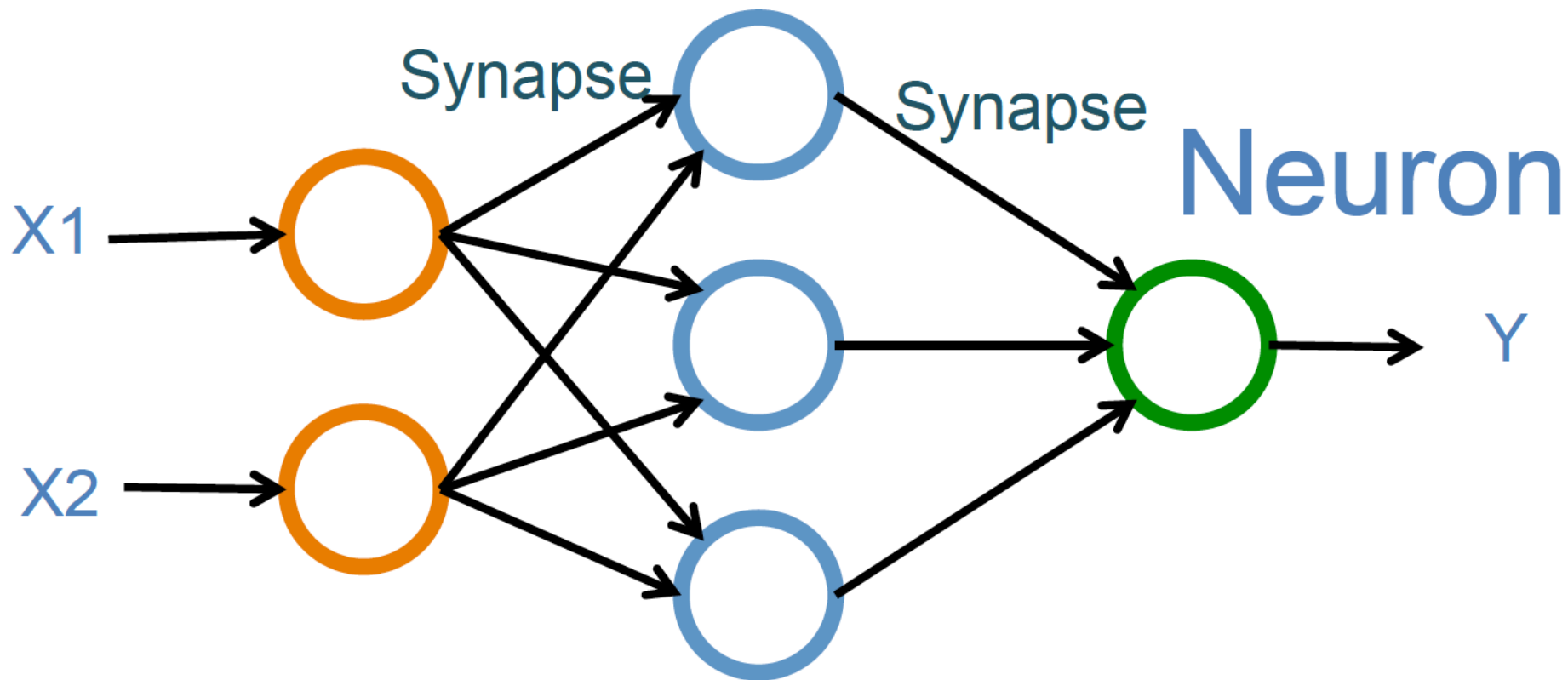


**Input Layer**  
(X)

**Hidden Layer**  
(H)

**Output Layer**  
(Y)

**Neuron**

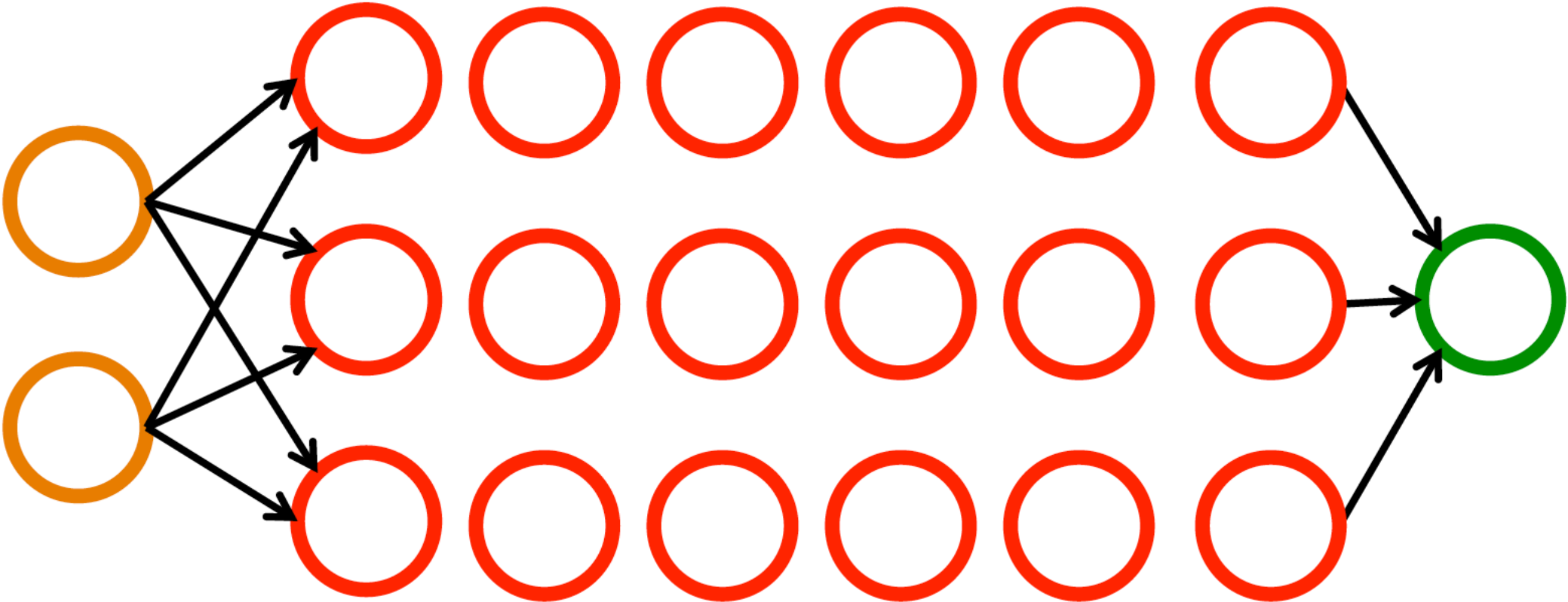


**Input Layer**  
(X)

**Hidden Layers**  
(H)

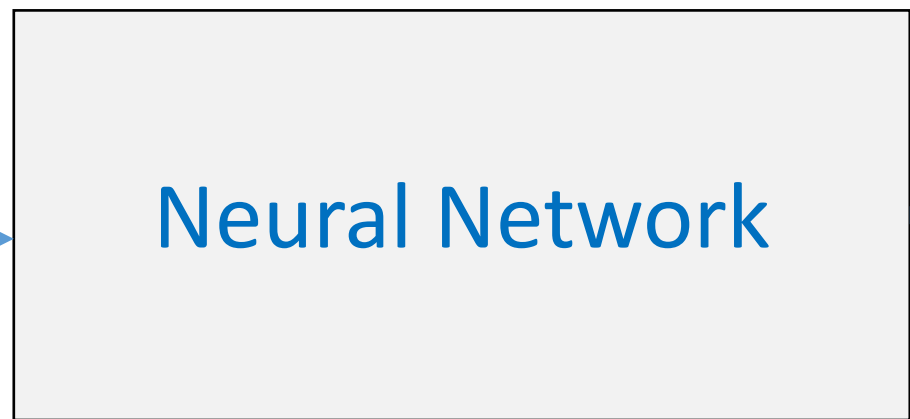
**Output Layer**  
(Y)

Deep Neural Networks  
Deep Learning





Hei alle  
sammen

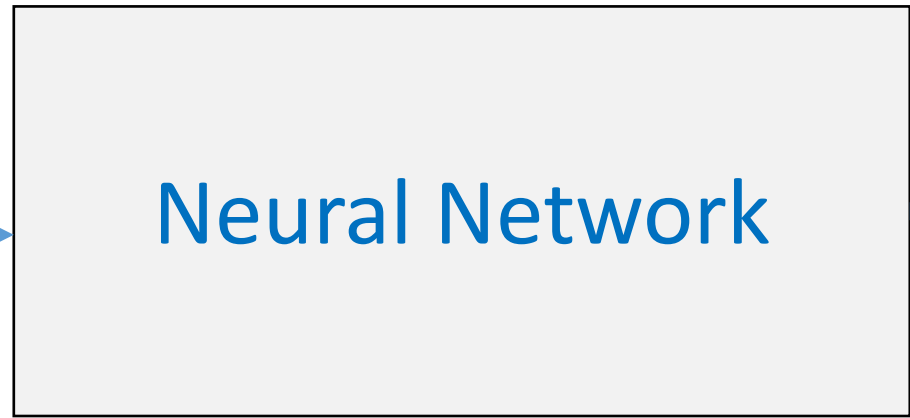


Neural Network



Norsk

Hi  
everyone



Neural Network

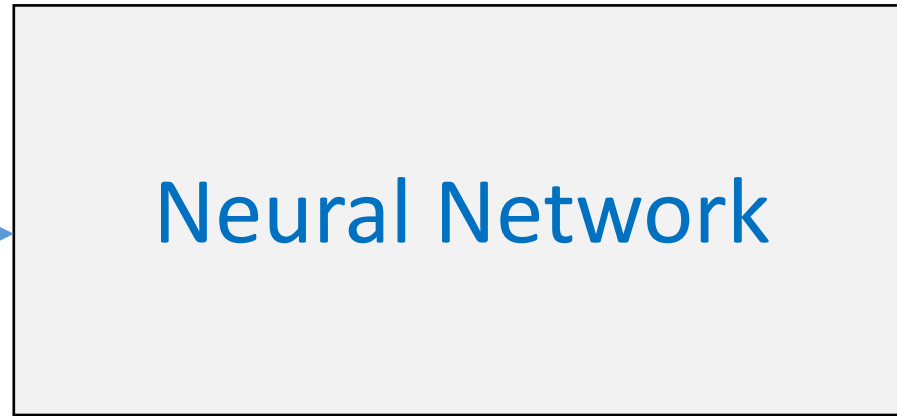


Engelsk

**Naïve ways of doing text classification?**

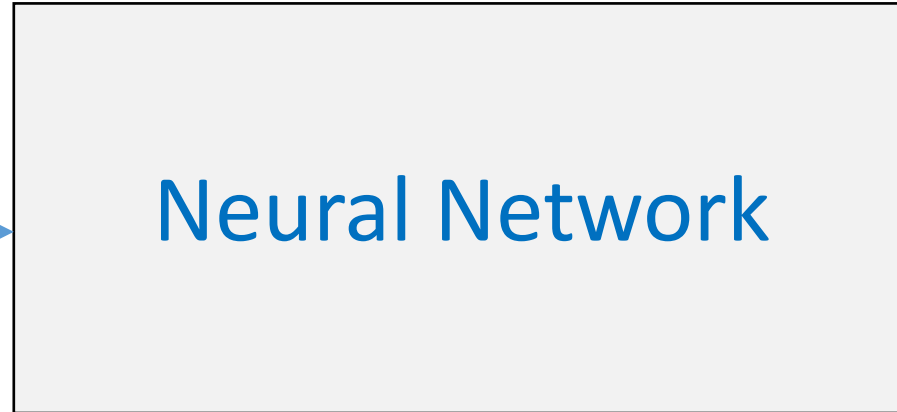


I like pizza  
and tacos



Food

I drive a  
big truck



Cars

Pizza 1

Taco 2

Sushi 3

Pizza

$$\begin{bmatrix} 1 & 0 & 0 \end{bmatrix}^T$$

Taco

$$\begin{bmatrix} 0 & 1 & 0 \end{bmatrix}^T$$

Sushi

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}^T$$

I want to order pizza and sushi

[1 0 1]

Any challenges with this method?



I want to order pizza and sushi

[1 0 1]

I want to order pizza, because I  
hate sushi. Raw fish is disgusting

[1 0 1]



- I want to order pizza and sushi?

- [1 0 1]

- I want to order pizza because I hate sushi. Raw fish is disgusting.

- [1 0 1]

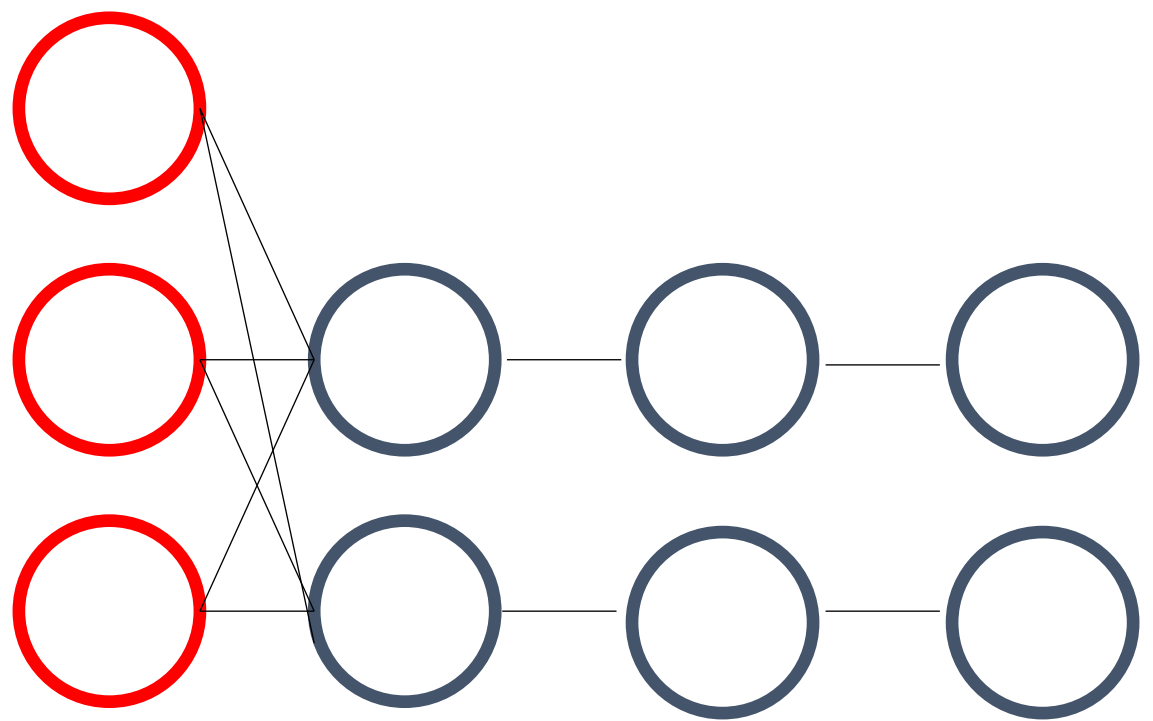
- LONG TEXT pizza
- [1 0 0]
- Short text pizza
- [1 0 0]

Make embedding for the vocabulary car, bike, truck



- Car: [1,0,0]
- Bike: [0,1,0]
- Truck: [0,0,1]

- Code: SimpleExample.py (start)



Input

Dense

Relu

Softmax

②

## Embeddings

Pizza  $[1, 0, 0]$

Taco  $[0, 1, 0]$

Sushi  $[0, 0, 1]$

## Classes

Food  $[1, 0]$

Cars  $[0, 1]$

Input sentence I like pizza

Input vector  $[1, 0, 0]$

First Layer : Dense 3

Weights :  $[-0.5, -0.5, -0.5, 0, 0, 0, 1, 1, 1]$

First :  $1 \cdot -0.5, 1 \cdot 0, 1 \cdot 1 = [-0.5, 0, 1]$

Second  $[0, 0, 0]$

Third  $[0, 0, 0]$

Output  $\begin{bmatrix} -0.5 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$



## Second Layer ReLU

(3)

Input

$$\begin{bmatrix} -0.5 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$f(x) = \begin{cases} x & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$$

Output

$$\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Thruval layer Dens

(4)

Weights:  $[0.5, 10]$

input  $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

$$\begin{bmatrix} 0 + 0 + 10 \\ 0 + 0 + 0 \\ 0 + 0 + 0 \end{bmatrix} \Rightarrow \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix}$$

Front Layer  
Flatten

input [10, 0, 0]

output [10, 0]

Fifth Layer Soft max

Input  $[10, 0]$

$$1: 10 / (10+0) = 1$$

$$2: 0 / (10+0) = 0$$

output  $[1, 0]$

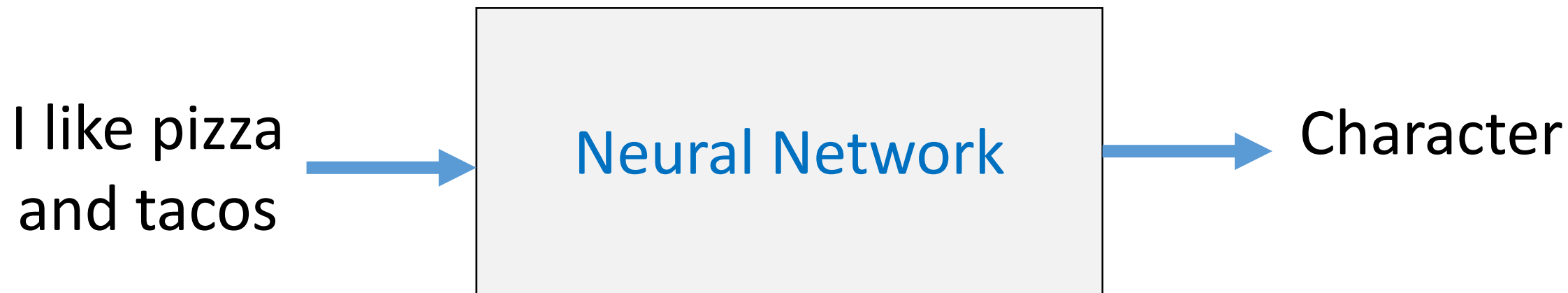
Class

Food  $[1, 0]$

Car  $[0, 1]$

100% Food

- Code: SimpleExample.py



- `MovieChatbot.py`

# Assignment

1. Login to <https://cair-hub.uia.no>
2. Username: demo00, demo01, ..., demo30
3. Password: Demo\_UiA\_2019
4. Run the Script: MovieChatbot.py
5. **Make your own model.** Suggestions
  - Change the layers (more, fewer, dropout, ...)
  - Change the input text



