

OHP Picture 1

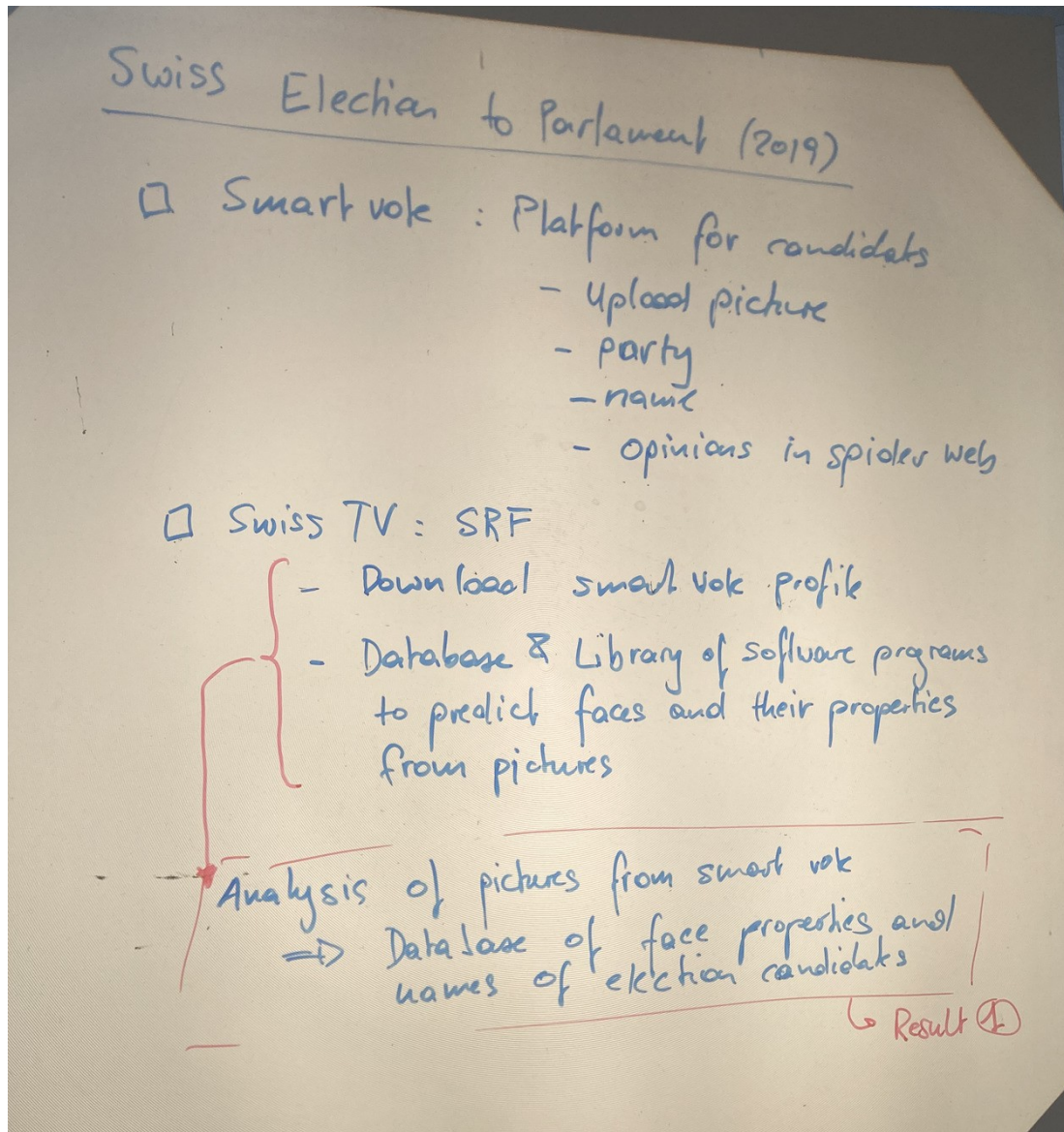
Course Concepts

- Linear Model categories:
 - Regression
 - Fixed linear effect
 - Mixed linear} Livestock Breeding & Genomics

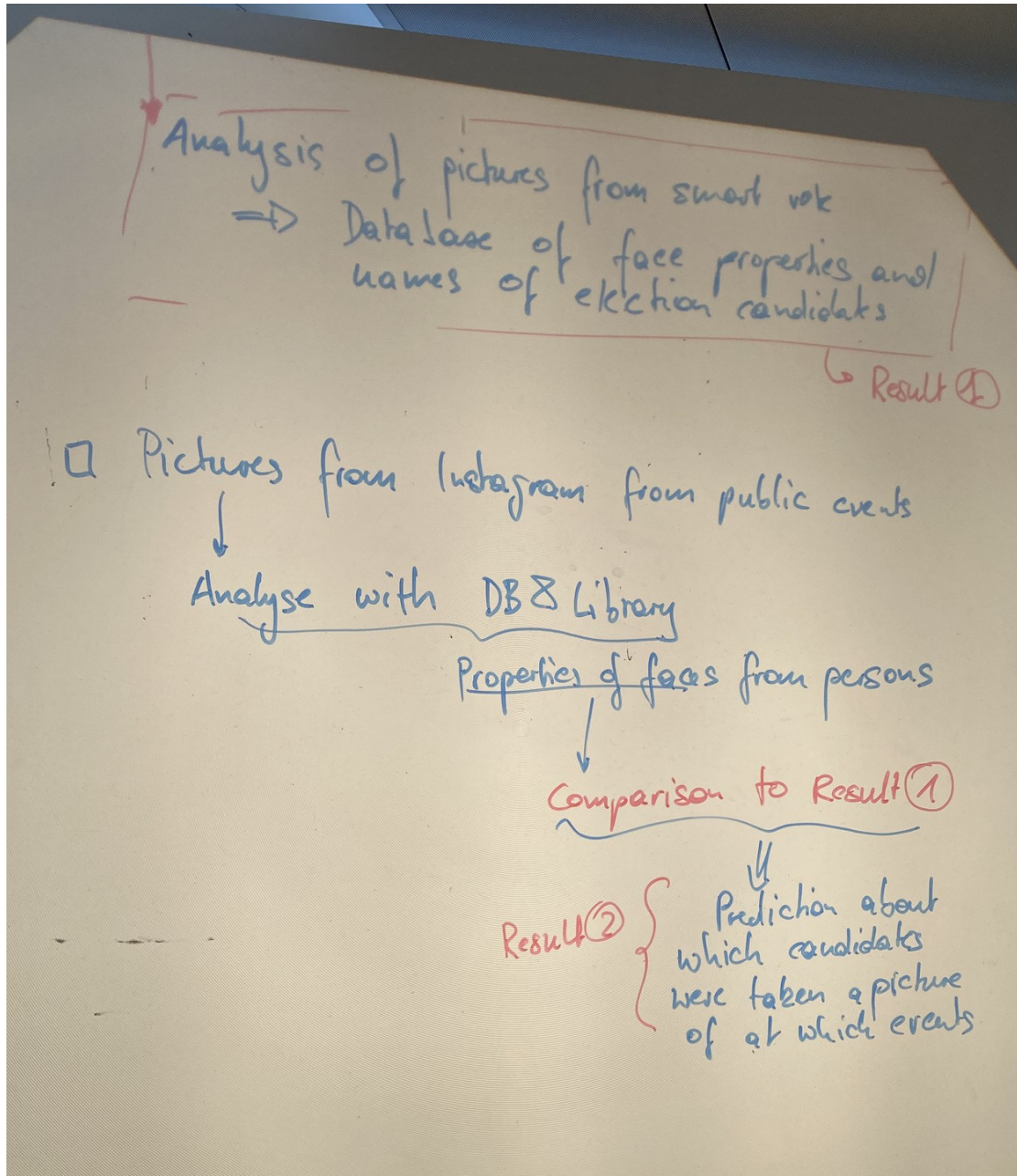
- Data Science:
 - Given data set
 - Analyse
 - Results

Example Dataset : Genomic Breeding Value Prediction

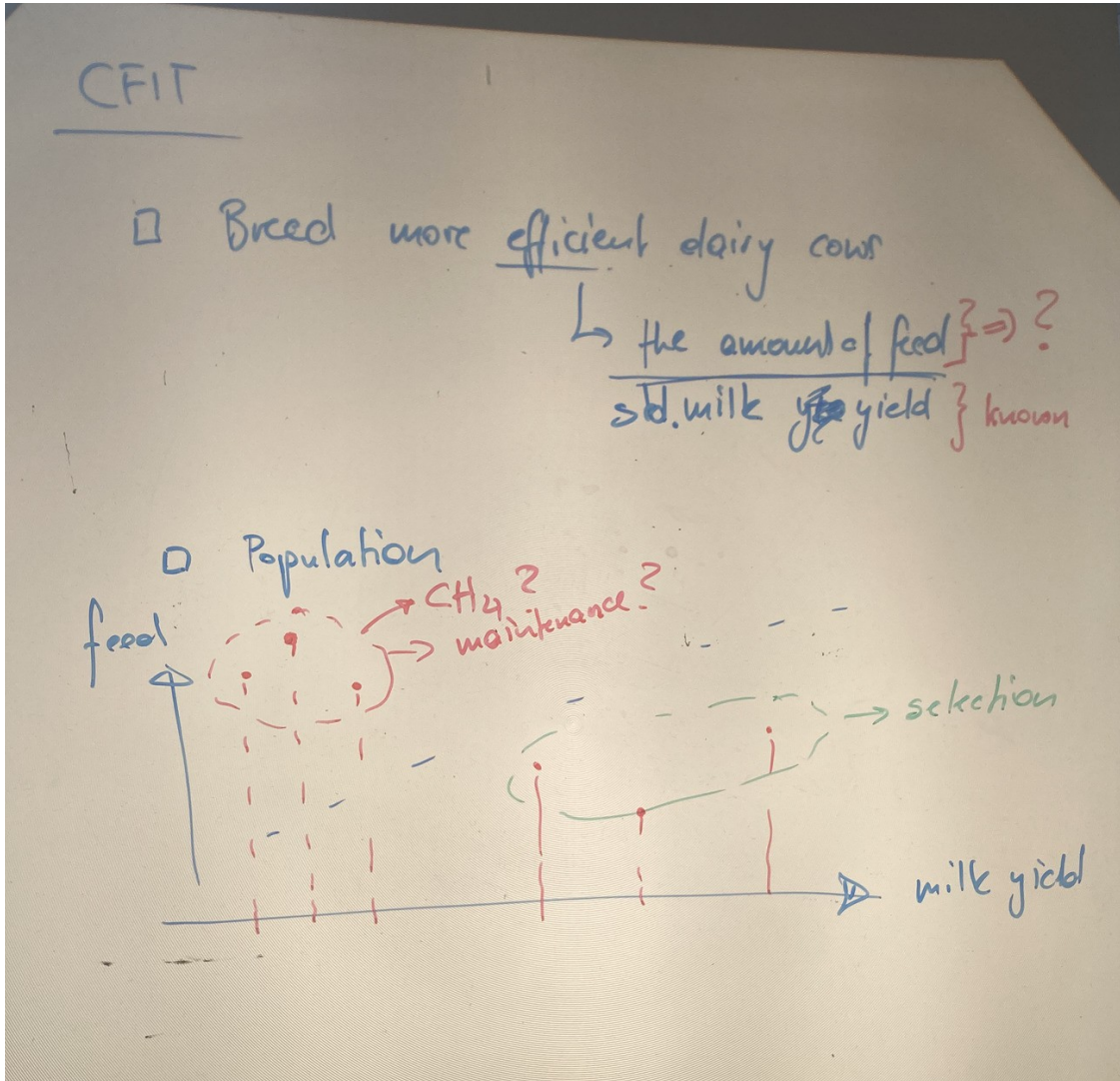
Animal	SNP ₁	...	SNP _k	Observation y
1	—	—	—	
2	—	—	—	
N				



OHP Picture 3

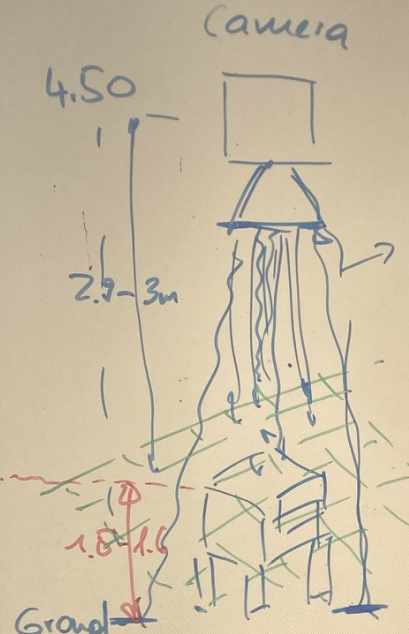


OHP Picture 4



OHP Picture 5

Time of Flight (TOF)



Camera

4.50

2.9-3m

1.5-1.6

Ground

Light hitting the ground:

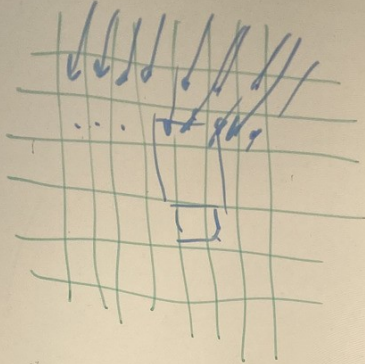
- Distance : 9 m
- Receiver in camera measure time of flight for light beam : t_1
- Speed of light : $3 \cdot 10^5 \text{ km/s}$
 $\hat{=} 3 \cdot 10^8 \text{ m/s}$

For sea waves hitting the ground:

$$t_1 = \frac{9 \text{ m} \rightarrow \text{distance}}{3 \cdot 10^8 \text{ m/s}} = 3 \cdot 10^{-8} \text{ s} = 30 \text{ ns} \rightarrow \text{measured}$$
$$\underline{t_2} = \frac{6 \text{ m} \rightarrow \text{distance}}{3 \cdot 10^8 \text{ m/s}} = 2 \cdot 10^{-8} \text{ s} = 20 \text{ ns} \rightarrow \text{measured}$$

OHP Picture 6

Picture of a cow from above



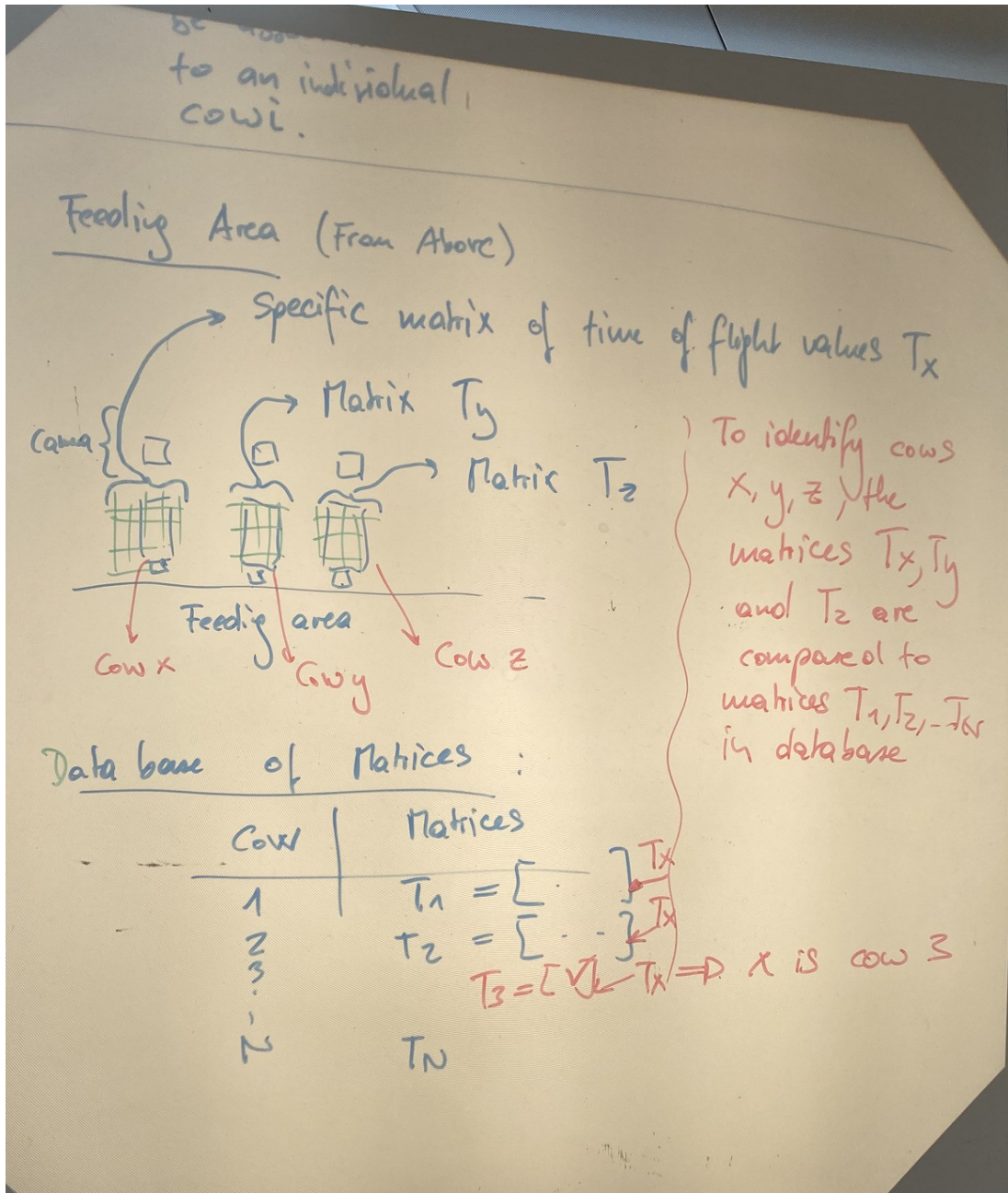
30	30	30	30				
30	30	30	22	29	21	30	
	30	30	21	18	22	30	

Matrix of time of flight values in (ns)

characteristic matrix (\mathbb{E}) for the individual cow standing below camera

Together with ear tag reader the matrix $\mathbb{T}_{i,cow}$ be associated to an individual cow i .

OHP Picture 7



Comparison of time of flight matrices

□ Not rely on exact matches between a matrix T_x from the feeding area and a given matrix T_i from the identification database, because an exact match means

if $T_x = T_i \Rightarrow$ dimensions equal

every element $(T_x)_{lk} = (T_i)_{lk}$ in row l and column k

□ Instead of exact match, take ~~etc~~ the matrix T_i that is "closest" to the matrix T_x

Closest match

□ Take matrix T_x and sort the values ~~according to~~ numerically:

$$T_x = \begin{bmatrix} 30 & 30 & \dots & 30 \\ 30 & 27 & 26 & 21 & 19 & \dots & 30 \\ 60 & 28 & 25 & 17 & 18 & \dots & 30 \end{bmatrix}$$

Vector with sorted values and remember row and column indices

$$y = \begin{bmatrix} 16 \rightarrow (2,2) \\ 17 \rightarrow (5,4) \\ 18 \rightarrow (3,5) \\ \vdots \\ 30 \end{bmatrix}$$

$$T_i = \begin{bmatrix} 30 & \dots & 30 \\ \vdots & & \vdots \\ \vdots & & \vdots \end{bmatrix} \Rightarrow \text{Sort the same way as } T_x \Rightarrow \text{creates vector } x$$

$$x = \begin{bmatrix} (T_i)_{2,2} \\ (T_i)_{5,4} \\ \vdots \end{bmatrix}$$

