

Ortho Eyes

Tony Andrioli

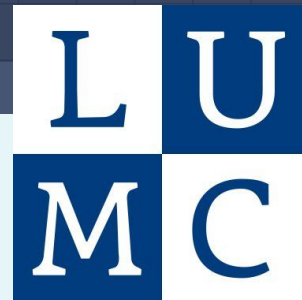
Business IT & Management

- Kasper van der Hoofd
- Vincent van den Oord
- Luke de Keizer

Applied Mathematics

- Carlijn Konings
- Rogier Zitman

Our Client



Dr. ir. J. H. (Jurriaan) de Groot
Hoofd Research and Development

Vakgebied(en)

- Innovatie in diagnostiek en behandeling (Centraal neurologische & Neuromusculaire aandoeningen, Schouderpathologie)
- Hoofd Laboratorium voor Kinematica en Neuromechanica (LK&N)
- Blokcoördinatie Technische Geneeskunde



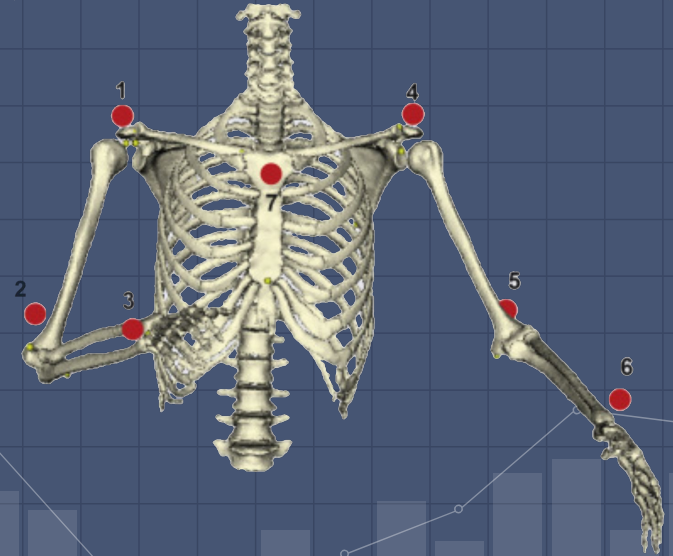
The data

The Leiden University Medical Center's 'Flock of Birds'- system

- 7 sensors
- Every sensor measures:
 - Location in 3D
 - Rotation in 3D

Time series of these sensors are stored.

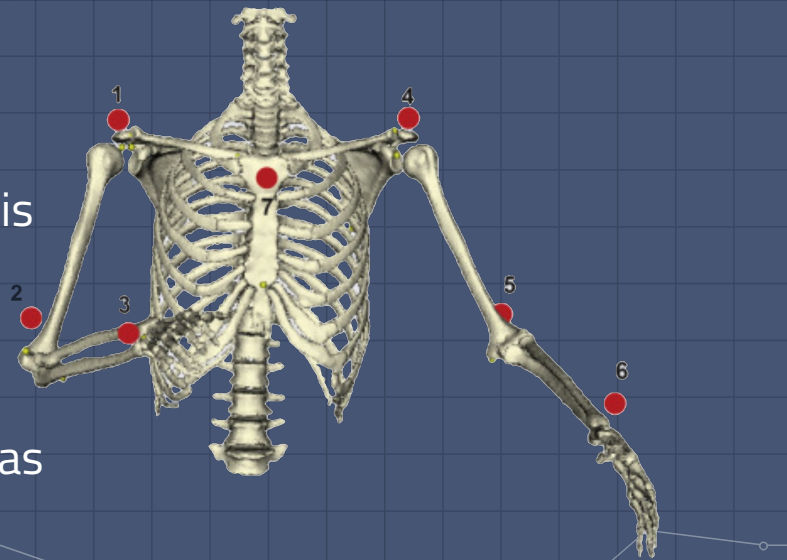
Sensor data is used to examine the (limitations of) movements of bones from the shoulder joint.



The data

The data is handed over in 2 forms:

- ▣ RAW sensor data
- ▣ Cleaned sensor data: Location information is lost, rotation information is translated into angles of bones.



Research on the mobility of the shoulder joint has been done on several patient groups. The available data is an anonymized version of the recorded data.

The questions

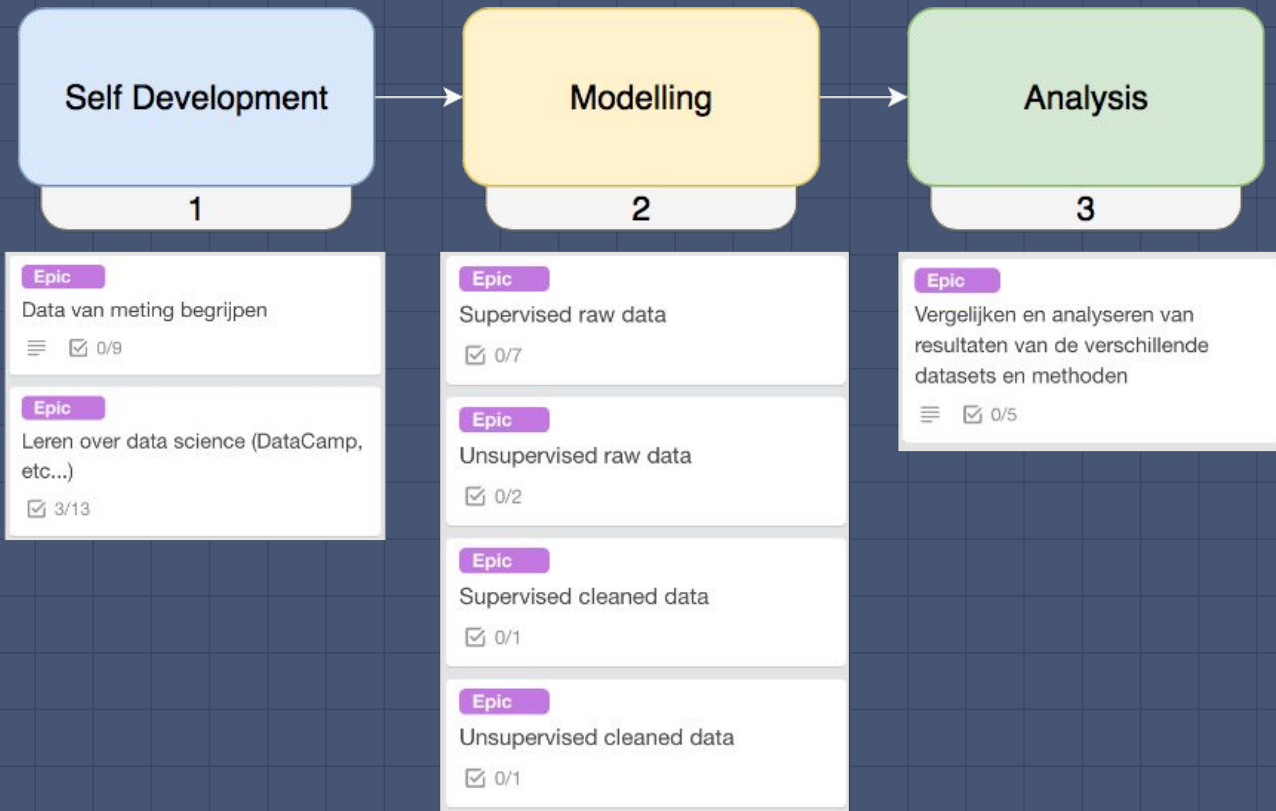
- Research has been done on different patient groups. But it is unknown to what extent the data can be used to distinguish these patient groups. Or as put by Kolk et al., (2017):

“investigate whether kinematic analyses of shoulder motion are useful for diagnostic purposes.”

In data science terms: make a classifier to differentiate the patient groups.

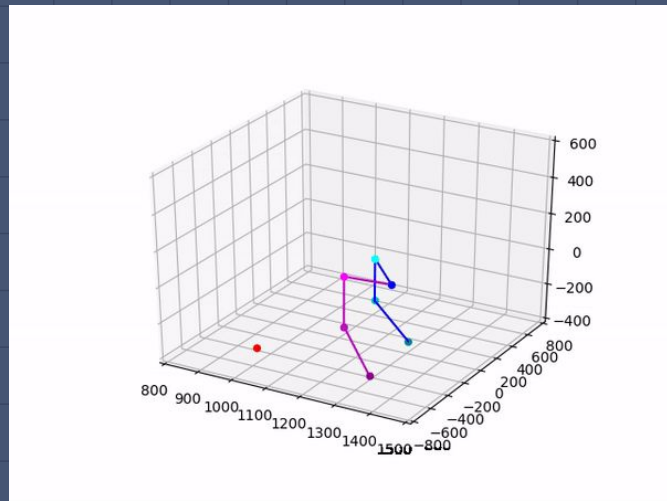
- What parameters contribute the most to this classifier.
 - Can the value of these parameters be measured more easily in the future?
- Is the assumption that the location data is irrelevant correct?

Approach:



What have we achieved this sprint?

- Practiced Python (with DataCamp)
- Retrieved data
- Gained insights into the data
- Visualised the data
- Understood the math behind:
 - Euler angle
 - Rotation matrices in \mathbb{R}^3

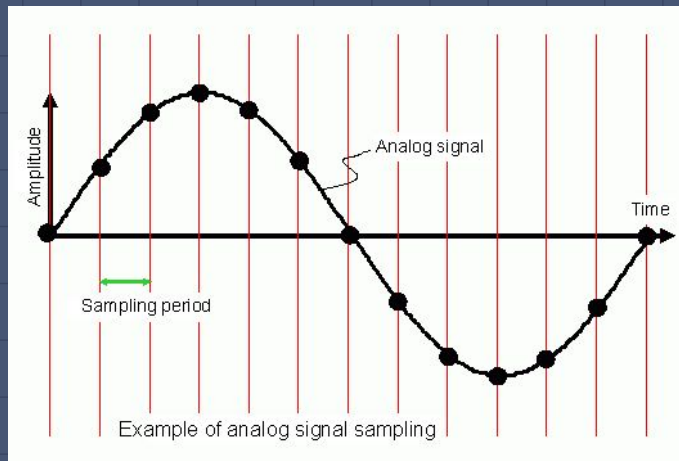


What have we planned?

- A meeting with de Groot (LUMC)
- Calculating with Euler angles
- Continuing the DataCamp course
- Receiving the remaining data
- Trying to use machine learning / regression techniques on the LUMC data.
 - For example:
 - Compare left and right shoulder
 - Compare position of shoulder and rotation of shoulder blade

The problems we face or expect to face

- Difficulty calculating Euler angles
- Sample frequency is not constant
- Difficulty using regression techniques for the analysis of time series





Any questions or suggestions?