Morphotype of the human body in the textile industry: a clustering approach

Steve de Rose

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Context: LabCom DiTex

DiTeX is a joint research and development laboratory between the University of Technology of Troyes and the French Institute of Textiles and Clothing.

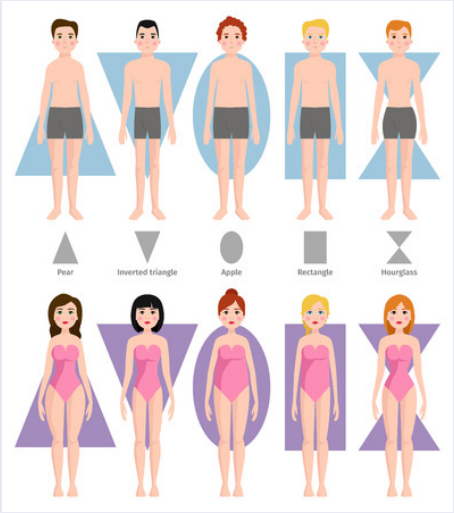
Statistical modelling and machine learning to analyse data from clothing and to respond to problems.

- The measurements of the human body:
  - What is the effect of ageing?
  - What are the types of morphologies?

Issue: Morphotypes

The **variety of human morphologies** is an important issue for the textile-apparel industry. Indeed, sizing systems currently used by companies have to be continuously updated or adapted to the population target.[1, 2]

Enables proper organisation of garment sizing systems.



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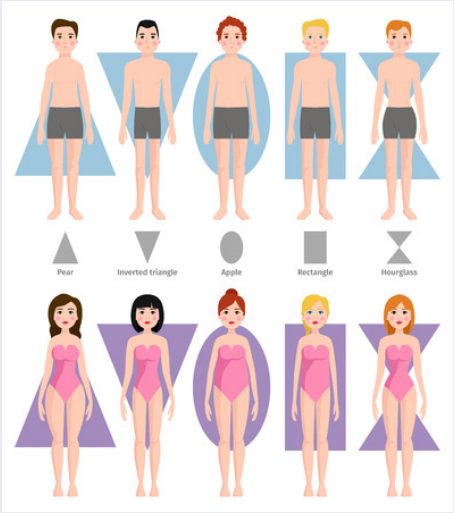
How can these groups be defined?
How do we associate an individual with a group?



Project milestones

1. State of the art of different techniques and methods.

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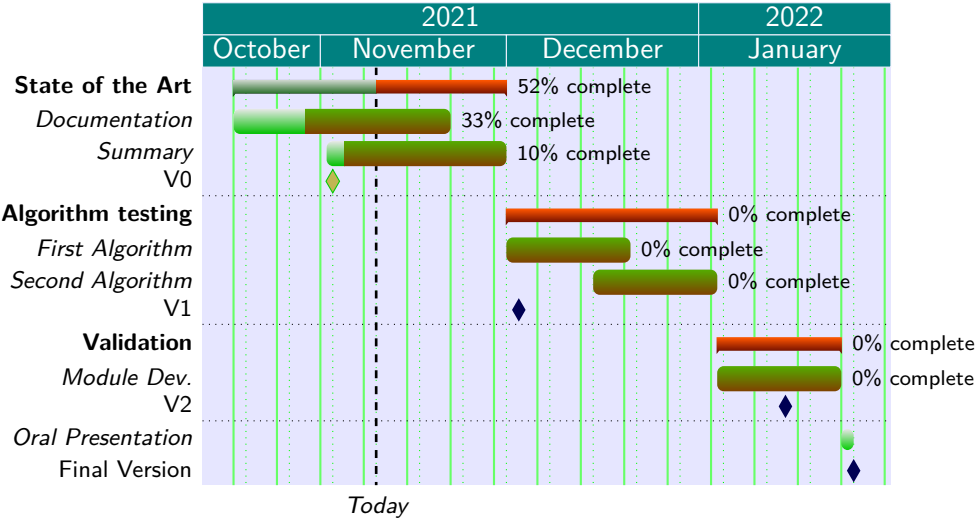
Related issues

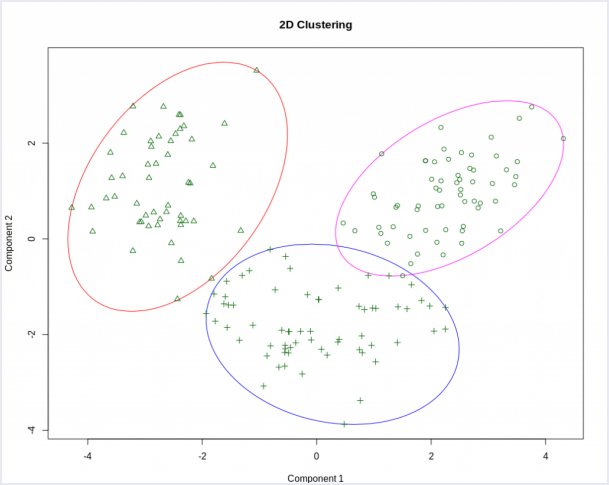
- Same groups for men and women?
- Standardisation?

Roadmap


2021
2022
October
November
December
January
State of the Art
Documentation
Summary
V0
Algorithm testing
First Algorithm
Second Algorithm
V1
Validation
Module Dev.
V2
Oral Presentation
Final Version
52% complete
33% complete
10% complete
0% complete
0% complete
0% complete
0% complete
0% complete
Today

Tip: Clustering

From the measurements of the human body:



How to associate groups with data?

Various Algorithms

- K-means
- Hierarchical
- By density

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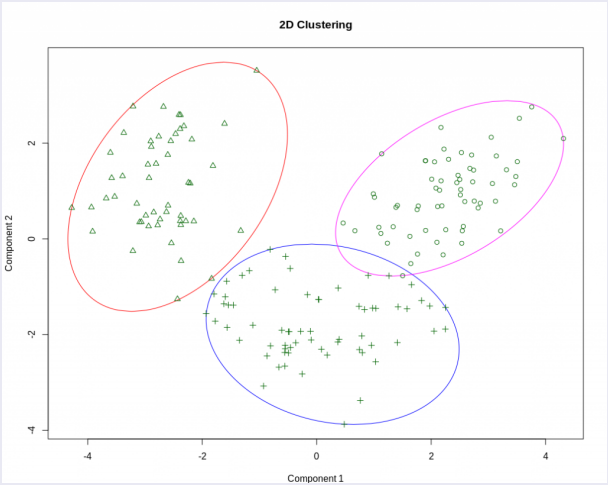

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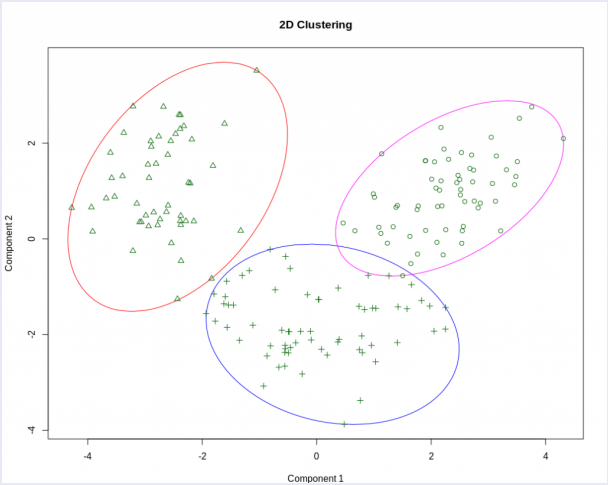

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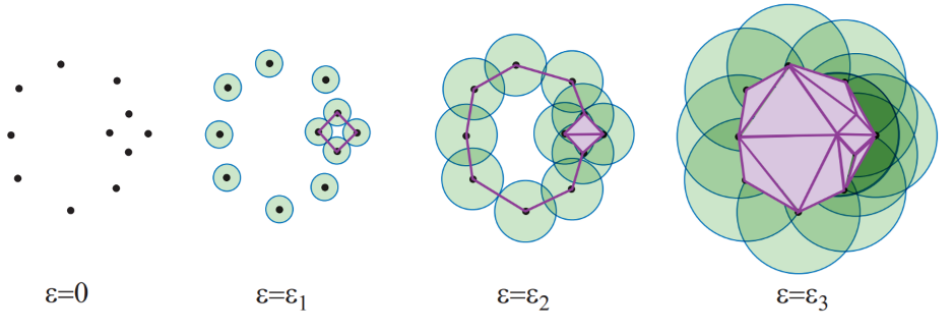
What measurements should be used?

Tip: Topological Data Analysis

Use the tools of algebraic topology to study the structure of data



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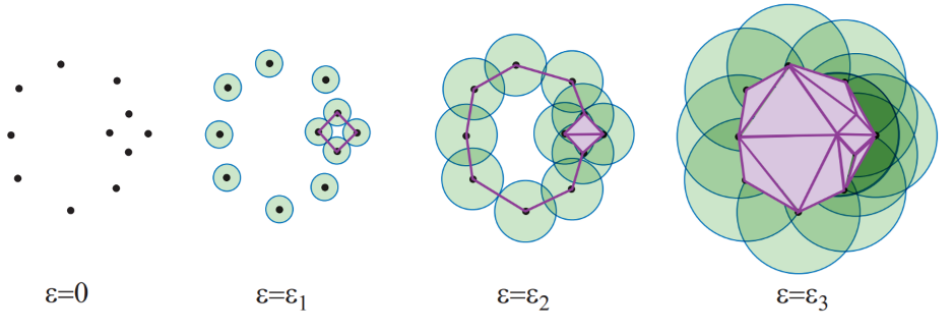

Chain complexes (Čech, Vietoris-Rips, ...), associated homology

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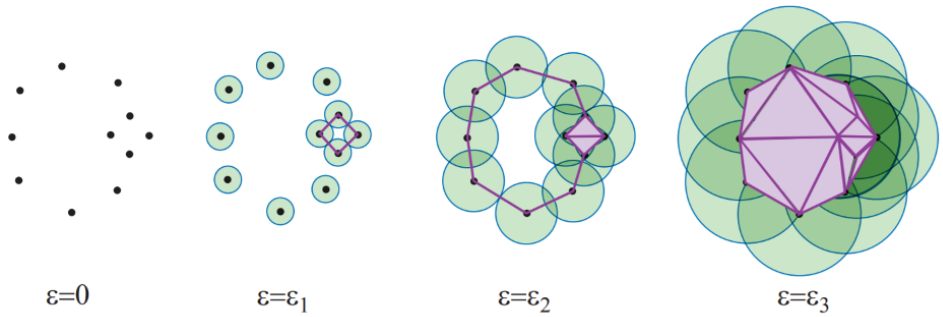

Chain complexes (Čech, Vietoris-Rips, ...), associated homology

Obtain topological and geometrical information (connectivity, loops, holes, curves, etc.)

Bibliography


K. Simmons, C. L. Istook, and P. Devarajan, "Female Figure Identification Technique (FFIT) for Apparel - Part I: Describing female shapes," *Journal of Textile and Apparel. Technology and Management*, vol. 4, no. 1, Summer 2004.


M. Hamad, S. Thomassey, and P. Bruniaux, "A new sizing system based on 3D shape descriptor for morphology clustering," *Computers & Industrial Engineerings*, vol. 113, pp. 683–692, 2017.