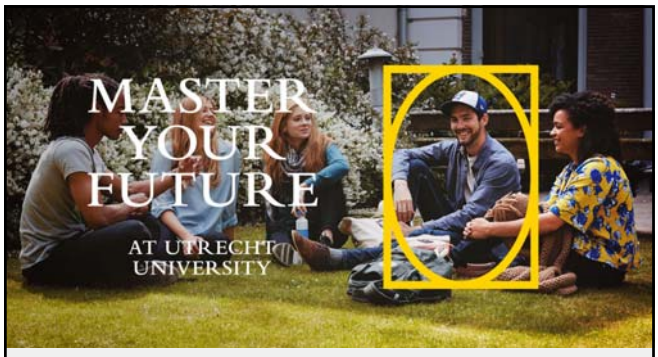

Applied Data Science Postgraduate

Dr. Marco Spruit

Agenda

1. What's Applied Data Science?
2. What's Applied Data Science for Health in Utrecht?
3. What's in it for you?
   a) Learning objectives
   b) Curriculum & Courses
   c) Research project
4. What should I know before I decide?
5. … And then what?

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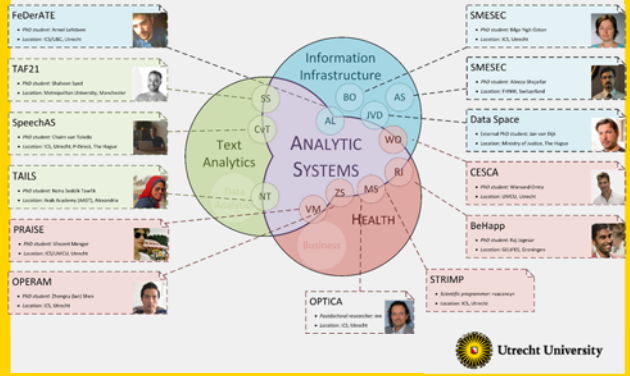
About Me



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About You

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Science
Data Science
Applied Data Science

1. WHAT'S APPLIED DATA SCIENCE?

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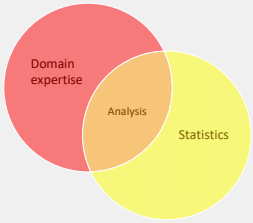
Science

- Domain expertise
- Statistics



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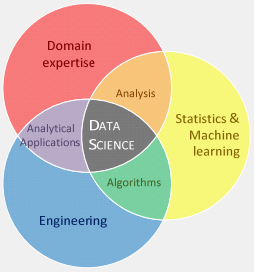
Data Science

- Domain expertise
- Statistics & Machine Learning
- Engineering
- *Analytical applications*



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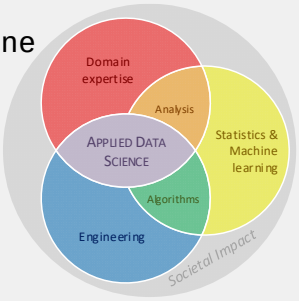
Applied Data Science

- Domain expertise
- Statistics & Machine Learning
- Engineering
- *Analytical applications*
- **Societal impact**



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SUMMARY

Title: MSc
Master's degree in: Biomedical sciences
Programme: Applied Data Science
Postgraduate
Accredited by the NVAO

"ADSP"

2. WHAT'S APPLIED DATA SCIENCE… *FOR HEALTH IN UTRECHT*?

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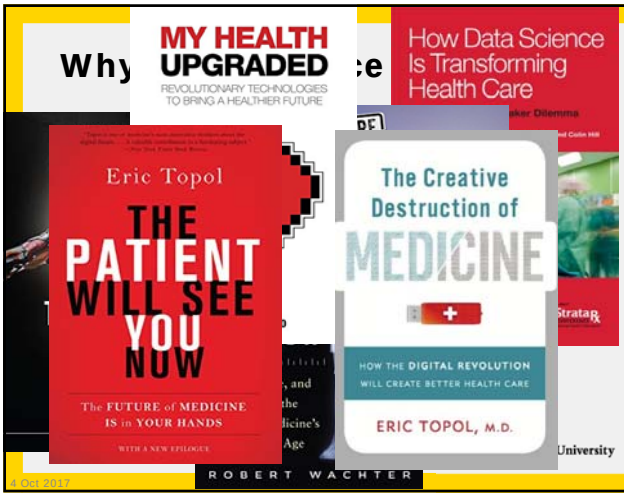
Why …



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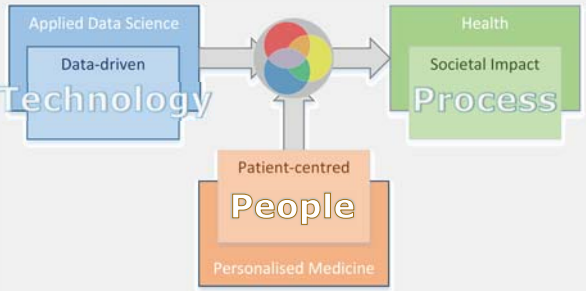
Conceptual Model



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What's so great about ADSP?

1. **Introduces** the first postgraduate Master's programme in the Netherlands that focuses on the application of data science in the field of health
2. **Embraces** multidisciplinary (both statistics & informatics) perspectives onto Applied Data Science
3. **Embeds** within the new Utrecht University focus area Applied Data Science to ensure an active data science community
4. **Leverages** the top research in the Faculty of Science, the Faculty of Social and Behavioural Sciences and the Faculty of Medicine

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a) Learning objectives
b) Curriculum
c) Courses
d) Research project

3. WHAT'S IN IT FOR YOU?

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Learning objectives

- Our MSc programme will teach you to:

1. Apply state-of-the-art concepts, methods and techniques in data science
2. Apply this knowledge and analyse large datasets for innovation in the domain of health
3. Understand the potential and risks of applying data science for research and society
4. Be able to work in interdisciplinary teams

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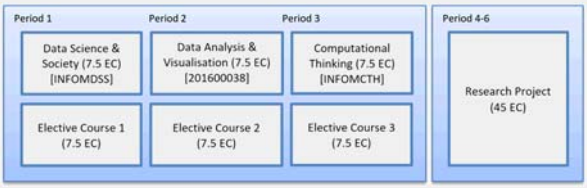
Curriculum



- Supports both fulltime and parttime participation

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Course 1: Data Science & Society

- Understand the role of data science and its societal impact
  1. Book review: *Explore data science and its societal impact*
- Recognise the knowledge discovery processes in applied data science
- Apply selected big data technologies to solve real-world problems
  2. Mid-term data analysis assignment: *MapReduce for Neonatology*
  3. Final data analysis assignment: *Spark for Epidemiology*

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Course 2: Data Analysis & Visualisation

- Covers both classical and modern topics in data analysis and visualisation
  - Exploratory data analysis (EDA)
  - Supervised machine learning and statistical learning
  - Unsupervised learning and data mining techniques
  - Visualisation techniques

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Course 3: Computational Thinking

- This course starts with an introduction to proposition logic and basic algorithmics
  - "How to think like a computer"
- Practice this thinking in building analytical applications in Python

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Sample of Elective Courses

- Faculty of Medicine
  - Ensembles of *e.g.*:
    Big Data in Health Research (1.5 EC), Clinical epidemiology (1.5 EC), Missing data (0.9 EC), Mixed models (1.5 EC), Survival analysis (1.5 EC), Genetic epidemiology (1.5 EC), Pharmacoepidemiology & Drug Safety (1.5 EC), Advanced Topics in Causal Research (1.5 EC), Prognostic research (1.5 EC), IPD meta-analysis (1.5 EC), Electronic health record data, …
- Faculty of Geosciences
  - Health & Geography (7.5 EC)
- Faculty of Social and Behavioural Sciences
  - Methodology of applied data science (7.5 EC)
- Faculty of Science
  - Data mining (7.5 EC), Pattern recognition (7.5 EC), Business Intelligence (7.5 EC), Text Analytics (7.5 EC), …

Focus on "personalised programming"

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Research Project

- Experience what you have learned under multidisciplinary supervision
- @
  - UMC Utrecht research group
  - Utrecht Platform for Applied Data Science (UPADS)
  - Applied Data Science Lab (ADS Lab)
  - Other UU research group
  - External company

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Current UMCU thesis projects 1

- **Cardiology:** Apply supervised learning classification algorithms on time series data of patient records to minimise bleedings and thrombosis, in patients with a left ventricular assist device (LVAD: support heart)
- **Neonatology:** Define a knowledge discovery process to facilitate domain experts in more easily exploring an analytical task's problem space more intuitively, to improve the treatment of preterm newborns

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Current UMCU thesis projects 2

- **Psychiatry:** Improve diagnoses of patients by refining the DSM-5 classification using machine learning
- **Intensive Care:** Employ available data while fighting alert fatigue with silent pumps
- **Cardiology:** Predict clinical events based on a patient's EHR text data using deep learning
- **Geriatrics:** Preprocess unstructured clinical data to reconstruct its structure according to interoperability standards utilizing NLP APIs
- *etc*

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a) Eligibility
b) Costs
c) Admission

4. WHAT SHOULD I KNOW BEFORE I DECIDE?

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Eligibility

- Relevant background
  - Master of Science degree (MSc)
    - OR Master of Applied Sciences degree (MAS)
  - Work experience
- In case of a deficiency
  - No statistics? No Health?
    - Admission under the condition that you complete an additional course or project before starting ADSP

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Costs

- This Master's programme is not state funded. This means this Master:
  - Has a total tuition fee of € 27,273 EUR
  - Requires up-front payment of € 18,182 EUR for the first year
  - Is not eligible for study financing from the Dutch student grant and loans system
  - Has a different application procedure

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Admission

- https://www.uu.nl/masters/en/applied-data-science-postgraduate/admission-and-application

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5. … AND THEN WHAT?

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What will become of you?

- "A data scientist is a practitioner who has sufficient knowledge in the overlapping regimes of
  - business needs,
  - domain knowledge,
  - analytical skills, and
  - software and systems engineering
- to manage the end-to-end data processes in the data life cycle."

Source: NIST SP 1500-1 NIST Big Data Interoperability Framework, (NBDIF): Volume 1, Definitions, September 2015 (online)

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The Sexiest Job of the 21st Century!

- Davenport, T., and Patil, D. (2012). Data Scientist: The Sexiest Job of the 21st Century. *Harvard Business Review, 90(5), 70-76.*

"shortage of data scientists"

"Data scientists want to build things, not just give advice. One describes being a consultant as 'the dead zone'"

"Data scientists today are akin to the Wall Street 'quants' of the 1980s and 1990s"

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Davenport, T. H., & Patil, D. J. (2012). Data scientist. The Sexiest Job of the 21st Century. Harvard business review, 90(5), 70-76.

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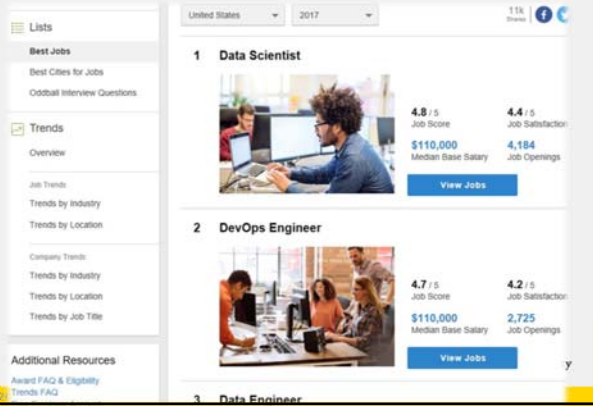
The best job in America in 2017



https://www.glassdoor.com/List/Best-Jobs-in-America-LST_KO0,20.htm

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Other positions & Capabilities

- Data analyst
- Data architect
- Data engineer
- Data manager
- Information specialist
- Consultant
- Leader in data intensive industries
- Entrepreneur in Big Data or Business Analytics
- Statistics, Spark, Scala
- R, Python
- Physics, PhD
- NoSQL, NLP, MongoDB
- Modelling, Maths, Masters
- Machine learning
- Java, Hive, Hadoop
- Engineering, D3, Computer Science
- C++, API, Big Data

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That's what.

- *Thank you for your attention!*

- Applied Data Science MSc Postgraduate
- https://www.uu.nl/masters/en/applied-data-science-postgraduate

- Contact: m.r.spruit@uu.nl

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