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Faculty of Informatics

Conquering Data: The State of Play in Intelligent Data Analytics

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Conquering Data

Identifying the data challenges of the future

Conquering Data:

The State of Play in Intelligent Data Analytics

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This paper is the basis for the creation of a research roadmap for *Conquering Data* in Austria. It summarises techniques for Intelligent Data Analytics, presents applications in which the analysis of data has the potential to generate significant value, discusses research challenges in the Intelligent Data Analytics area, and presents an Intelligent Data Analytics Competence Landscape of Austria. Further information on this work is available online at `http://conqueringdata.at/`

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http://conqueringdata.at

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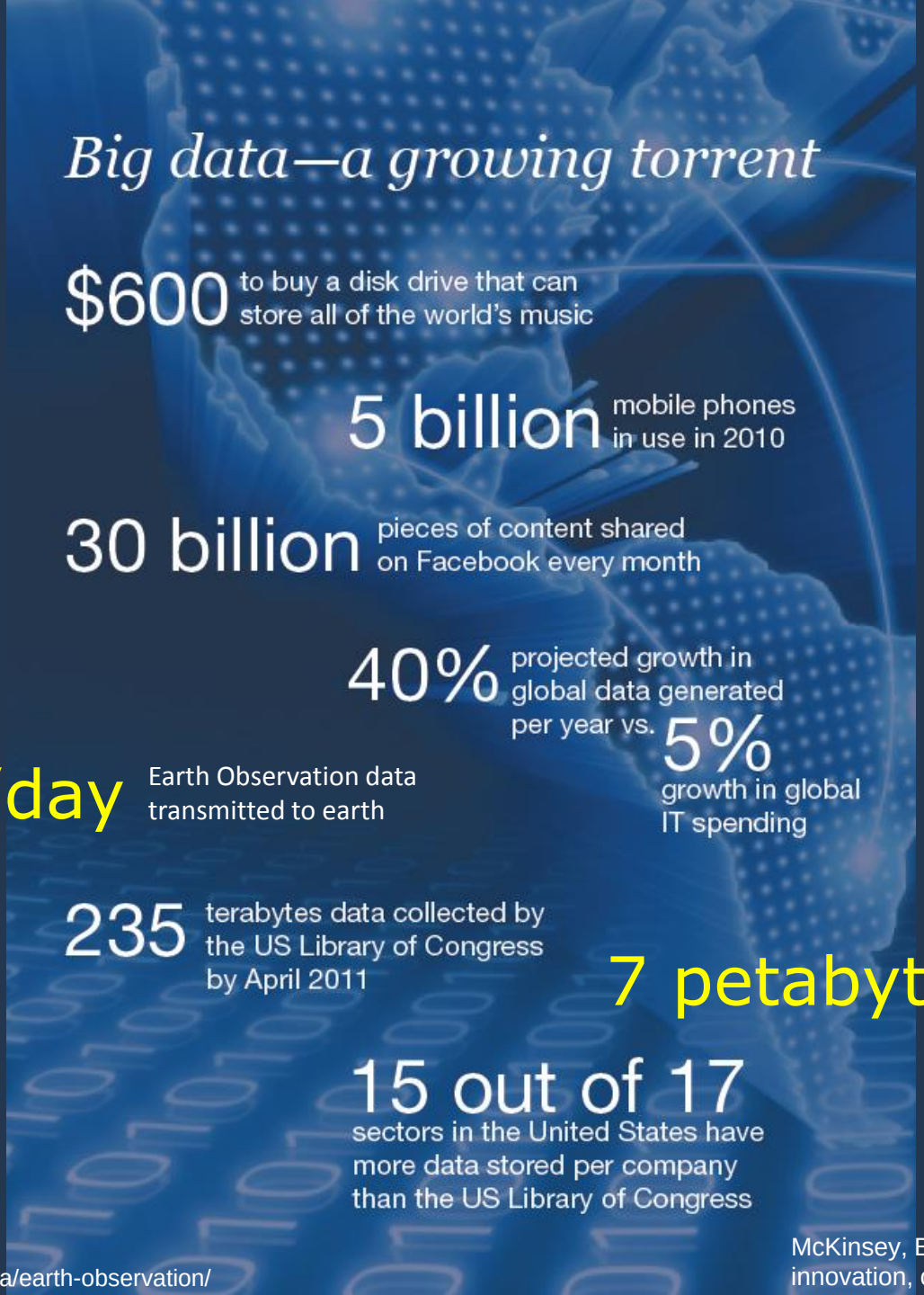
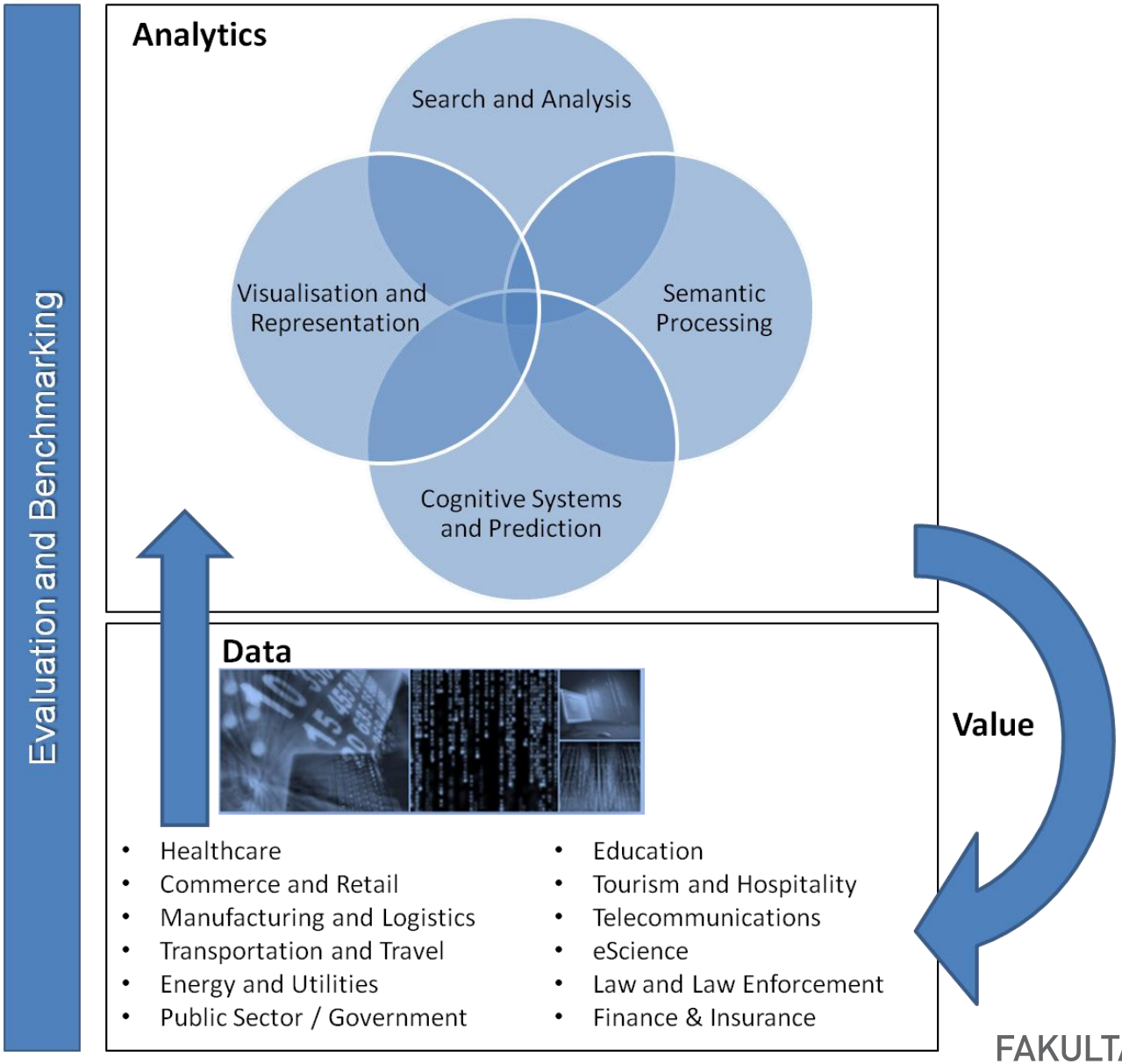


Terabytes/day Earth Observation data transmitted to earth

7 petabytes Earth Observation data in ESA archives (2012)

http://www.scidip-es.eu/science-data/earth-observation/

McKinsey, Big data: The next frontier for innovation, competition, and productivity, 2011


Evaluation and Benchmarking
Analytics
Search and Analysis
Visualisation and Representation
Semantic Processing
Cognitive Systems and Prediction
Data
Value
Healthcare
Commerce and Retail
Manufacturing and Logistics
Transportation and Travel
Energy and Utilities
Public Sector / Government
Education
Tourism and Hospitality
Telecommunications
eScience
Law and Law Enforcement
Finance & Insurance

Intelligent Data Analytics Research Fields

1 Search and Analysis

- Information Retrieval
- Computer Vision
- Speech Processing
- Process Analysis
- Network Science
- Ubiquitous Computing
- Information Integration
- Statistics
- Data Mining
- Bioinformatics
- Digital Preservation
- Algorithmic Efficiency

2 Semantic Processing

- Information Extraction
- Knowledge Engineering
- Semantic Web
- Natural Language Processing

3 Cognitive Systems and Prediction

- Machine Learning
- Computational Neuroscience
- Reasoning
- Recommender Systems
- Decision-Support System
- Simulation
- Crowdsourcing
- Brain-Computer-Interface

4 Visualisation and Interaction

- Visualisation
- Visual Analytics
- Rendering
- Sonification

5 Evaluation and Benchmarking

Challenges

Data Fusion and Data Integration

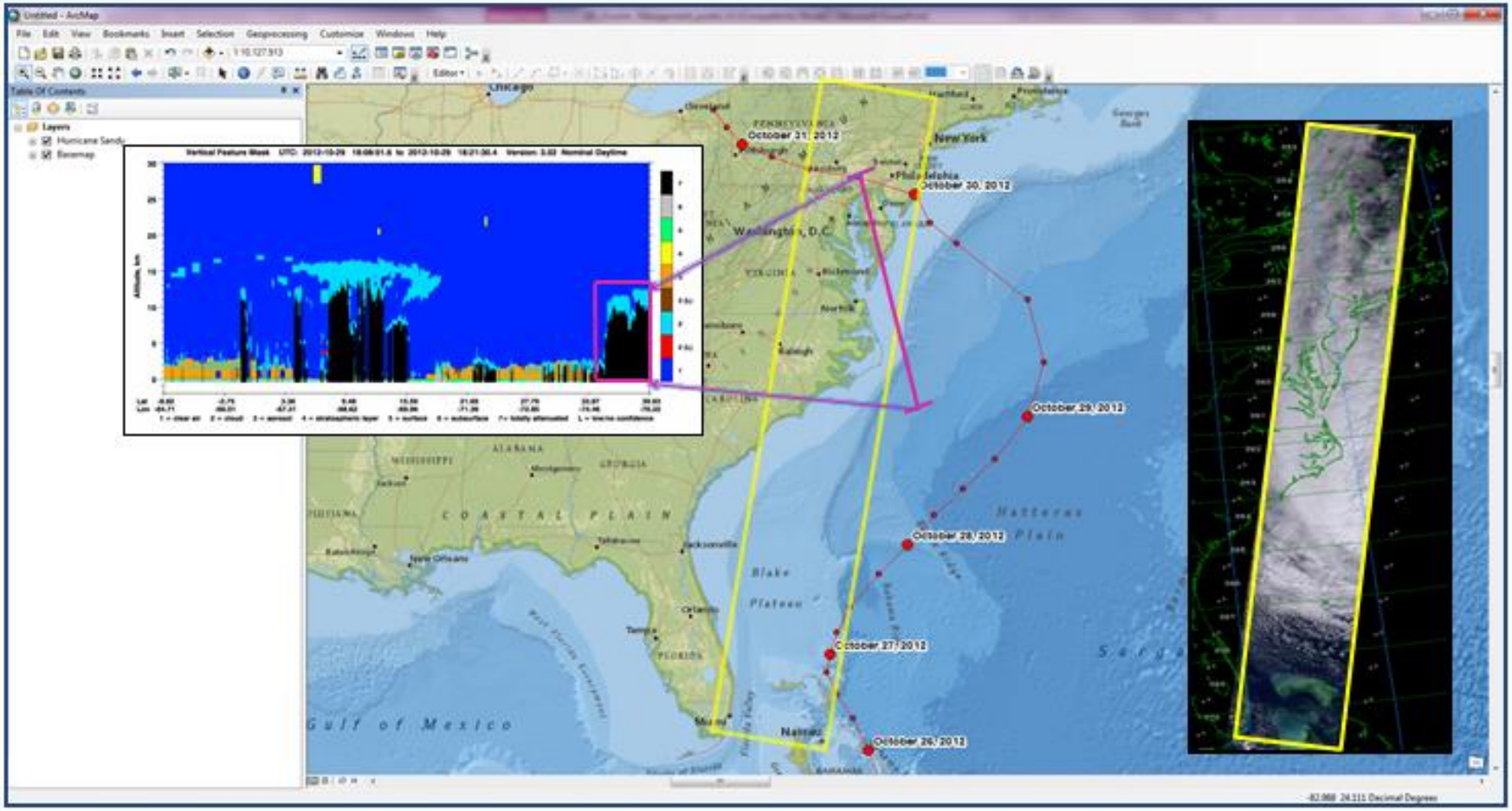


Figure 2. Produced by ASDC data, this map shows the track of Hurricane Sandy in 2012 with MISR and CALIPSO data products being highlighted in yellow and purple, respectively. Image Credit: Emily Northup & Matthew Tisdale.

http://www.earthzine.org/2013/10/18/using-big-data-in-geographic-information-systems-for-observing-earths-climate/

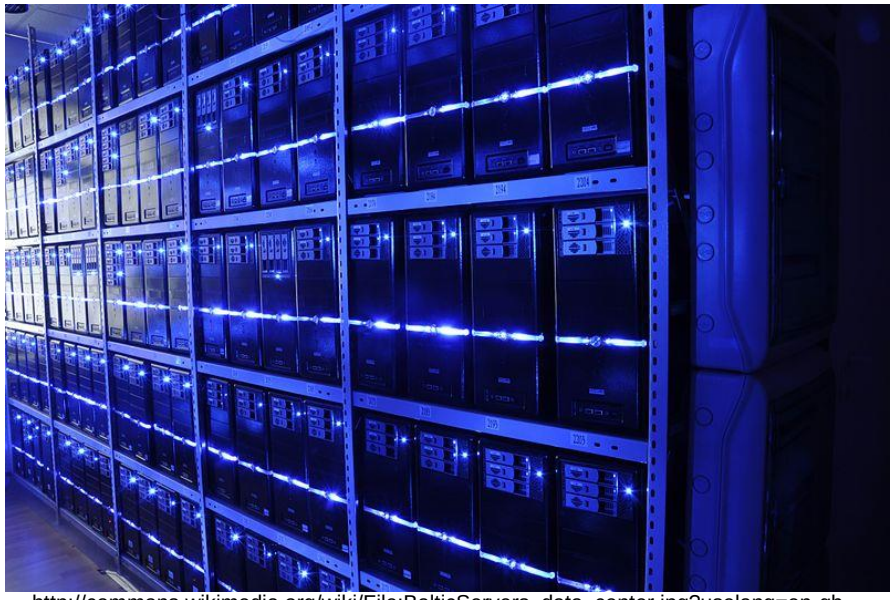
Experimental Infrastructure

- Which algorithm / method is best for a specific problem?
- Sharing data / algorithms / workflows
- Computational power for large datasets

HELIX NEBULA THE SCIENCE CLOUD

GEO GROUP ON EARTH OBSERVATIONS

Geohazard Supersites & Natural Laboratories



http://commons.wikimedia.org/wiki/File:BalticServers_data_center.jpg?uselang=en-gb

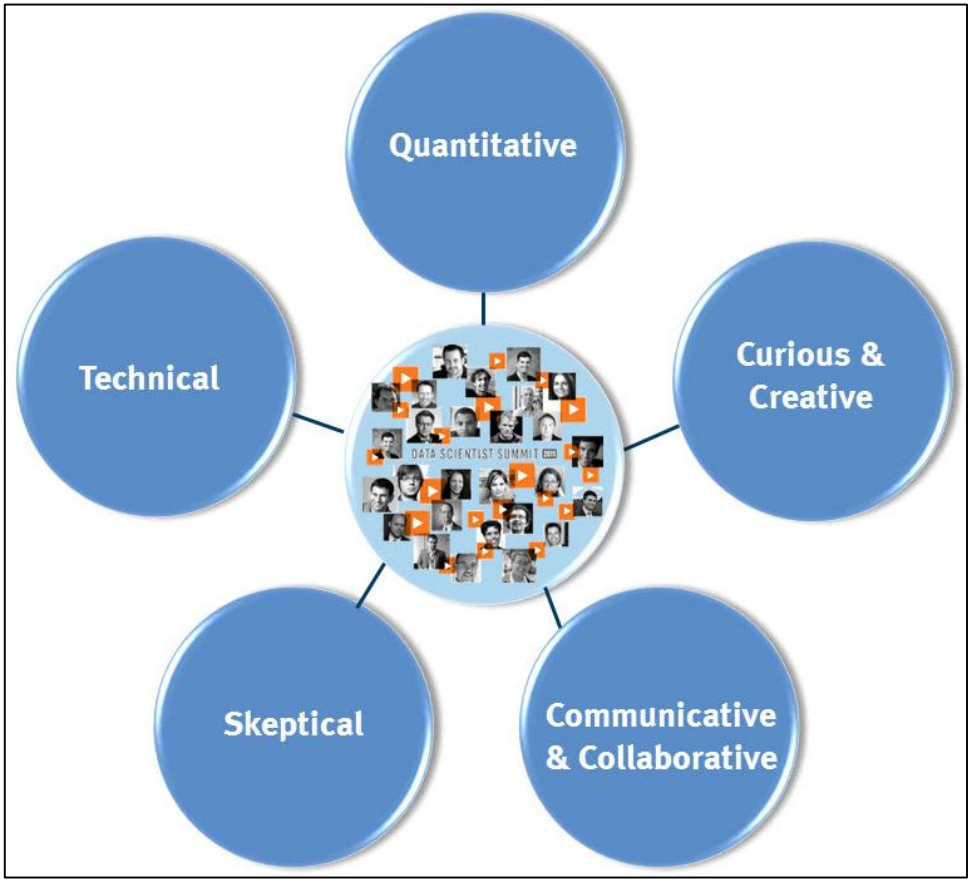
Privacy and Security

Google Streetview

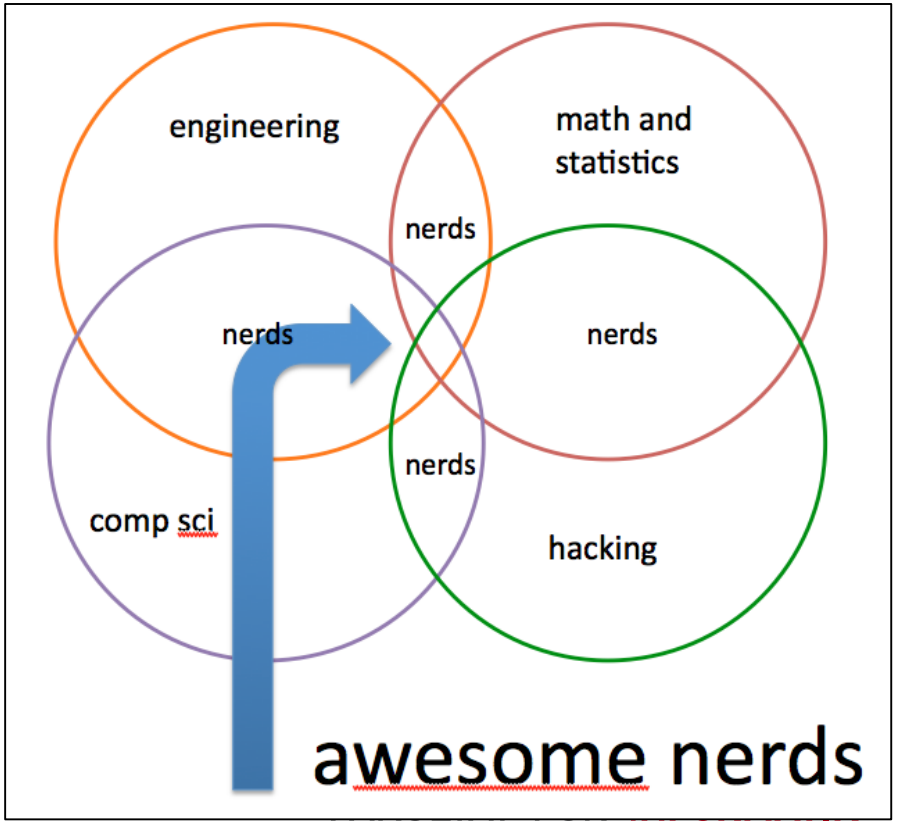
Qualified personnel

- Data scientists

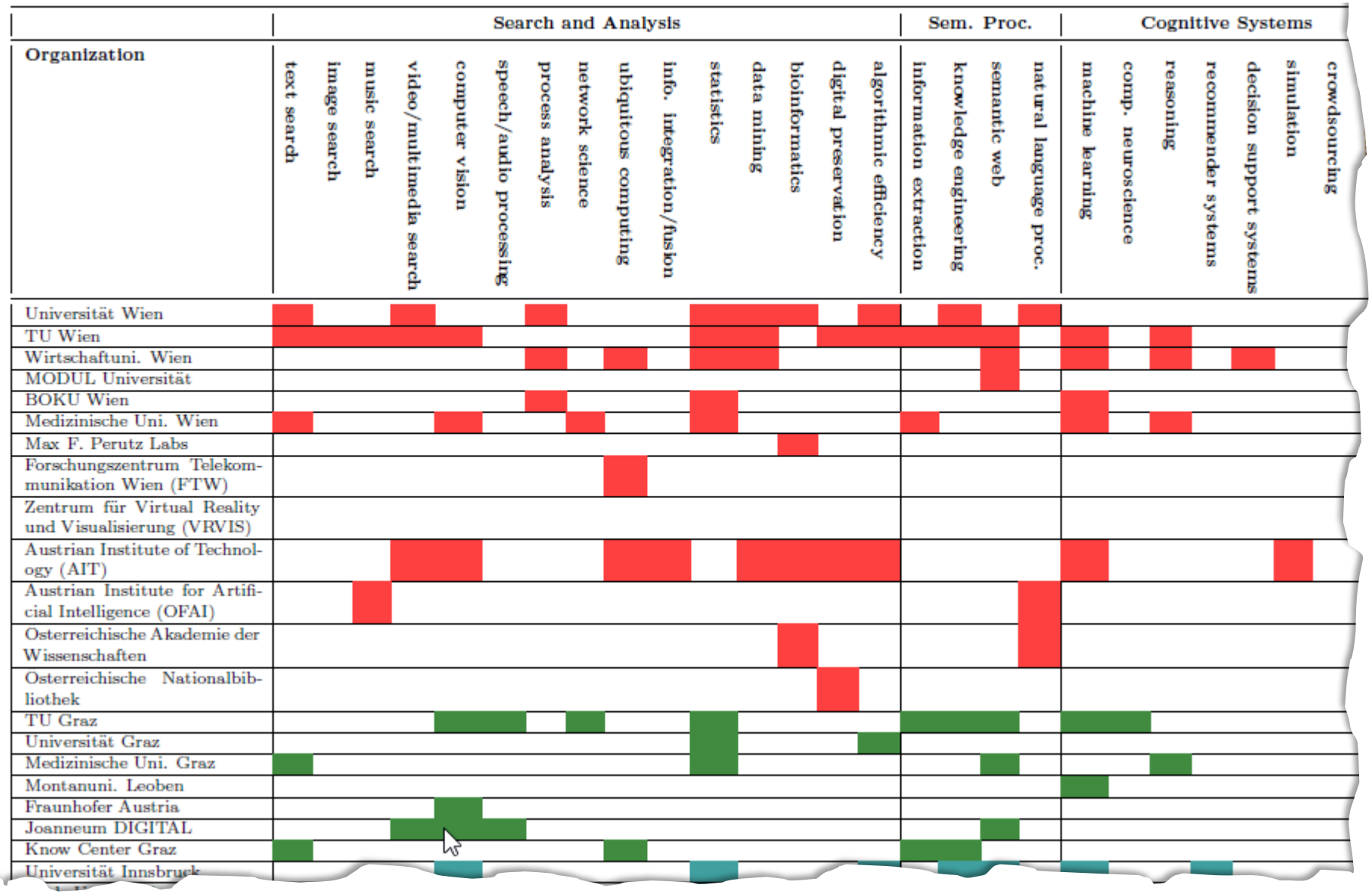
Data Scientist: The Sexiest Job of the 21st Century



https://infocus.emc.com/david_dietrich/a-data-scientist-view-of-the-world-or-the-world-is-your-petri-dish/



http://www.forbes.com/sites/danwoods/2012/03/08/hilary-mason-what-is-a-data-scientist/


Search and Analysis
Sem. Proc.
Cognitive Systems
Organization
text search
image search
music search
video/multimedia search
computer vision
speech/audio processing
process analysis
network science
ubiquitous computing
info. integration/fusion
statistics
data mining
bioinformatics
digital preservation
algorithmic efficiency
information extraction
knowledge engineering
semantic web
natural language proc.
machine learning
comp. neuroscience
reasoning
recommender systems
decision support systems
simulation
crowdsourcing
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