Universiteit Leiden

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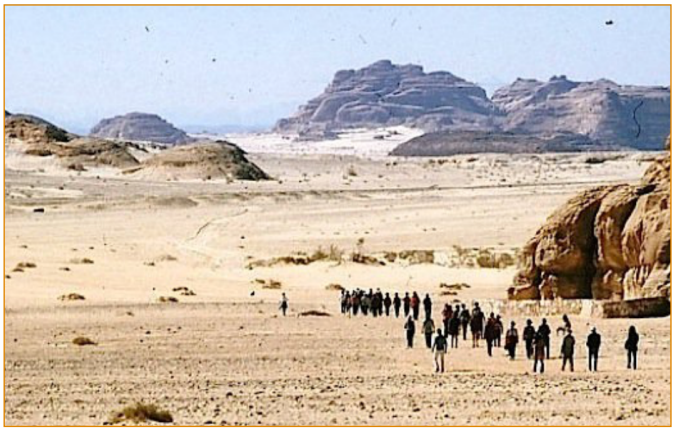
Featuring

Searching for the (un-)wanted effects of innovation

Mirjam van Reisen is professor in both Leiden and Tilburg, lives in Brussels and frequently travels to Africa for research. She deals with research topics such as ageing, health, migration and globalisation.

For Van Reisen ICT is not only a means; she is also intrigued by the impact of ICT on society. On the one hand, using big data and analysing social media, for instance, we can follow the spread of diseases, get a better idea of what migratory routes are used, and map how certain groups organise themselves into networks. But, on the other hand, we must not forget that ICT innovations can also be very disruptive.

To give an example: Many refugees from Africa travel through the Sinai desert in hopes of reaching Israel, but many of them are kidnapped by traffickers during the trip. The traffickers use mobile phones to call the families of the kidnapped refugees, and demand that large amounts of money are transferred through mobile services. Some ten years ago, this form of extortion would have been technically impossible. But now it has become part of migration patterns.
Of course no one has brought these ICT innovations on the market with the intention to facilitate human trafficking. But the problem is that we don't even think about adverse consequences.



Van Reisen is committed to not only looking at what we can do with big data and ICT, but also, to consider how it is changing society at large.

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Save the date: LIACS Annual Event, 18.01.2017

On Wednesday January 18, 2017 the Annual LIACS Event for Business and Industry will take place at the Academy Building in Leiden. This year we focus on Big Data and Anomaly Detection.

Anomaly detection is the identification of events, which do not conform to the common statistical definition of an outlier as a rare object. Typically the anomalous items will translate to some kind of problem such as bank fraud, a structural defect, medical problems or errors in a text.

To make the event accessible for all, we are working on a program that will offer you a mixture of science -, engineering- and business topics. The main idea behind this event is to support you and your organisation to become more effective in dealing with data, whilst providing you with the latest scientific insights in the domain of Data Science.

Invitations will be sent out early November. If you are interested to participate in this unique event, please drop us an email at events@liacs.leidenuniv.nl

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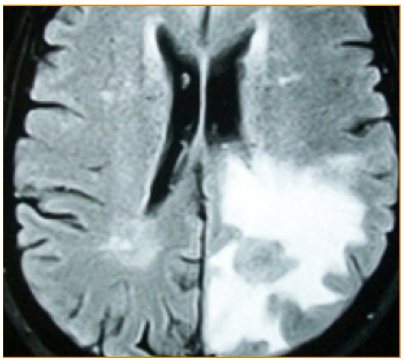
Understanding imagery by deep learning



Graphics hardware company NVIDIA awarded the Leiden Institute of Advanced Computer Science (LIACS) with a research grant to investigate deep learning in understanding imagery from sources such as MRI and X-ray.

'Computer Aided Medical Diagnosis Using Big Data' is one of the topics in which the LIACS Media Lab stands out, breaking new ground in deep learning algorithms. Michael Lew, head of the Media Lab, is enthusiastic about the grant: "We will use it to find new deep learning paradigms for combining the multi-modal information from different imaging modalities like MRI and X-ray.

The system will learn to recognize the contents of an uploaded picture. A live web demo shows the group's current work in automatic machine learning. Upload an image yourself and find out.

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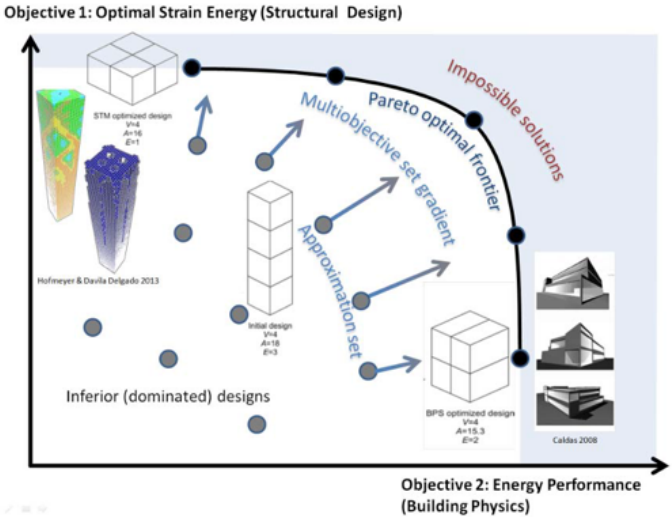
Algorithms to help improve building design

Modern optimization algorithms offer solutions for architectural decisions like space, structure and energy efficiency. PhD student Koen van der Blom, co-authored a paper that won the Best Paper Award at a leading conference in Krakow during the summer.



In architecture, there is a constant trade-off between many aspects of the building process. Architects may prefer to design beautifully shaped city icons. However, these may not be the most stable or energy-efficient ones. Koen developed algorithms that can lead to the optimal shape of a building and its wall configurations.

The paper was presented at the 23rd International Workshop of the European Group for Intelligent Computing in Engineering (EG-ICE), a well-established event in computational aspects of engineering.

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LIACS and ICTU start research on software quality

The Dutch government uses a lot of software – DigiD, for instance. Much of that software is developed by ICTU, a Dutch government organization that helps other government institutions in the realisation of digital services.

ICTU's software is developed using the Scrum approach, in which teams work on a particular subject during short periods of time (also known as sprints). The quality system generates all kinds of data regarding the progress of these teams: from the number of people working on a subject, to the use cases and the results. In the project Grip on Software (GROS), researchers from Leiden University will help ICTU to make more use of this system in terms of quality improvement.

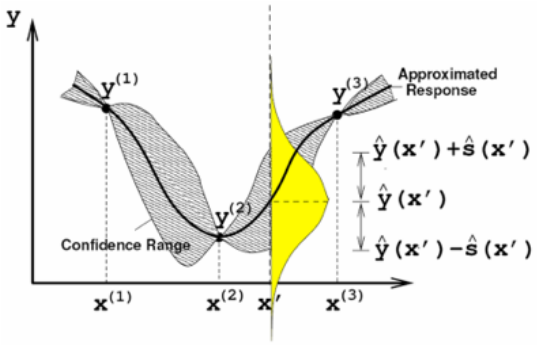
How can these teams work even better and more efficiently? The data from the quality system can provide clues, says project manager dr Fons Verbeek (Leiden University): 'What factors determine how successful the process of software development is? By looking at the data in a different way, and by discovering patterns in it, we can get a clear picture of that. That way, we can help improve the quality of software development for the government.'

Read more >

Research Worth Noticing: Kriging for Big Data

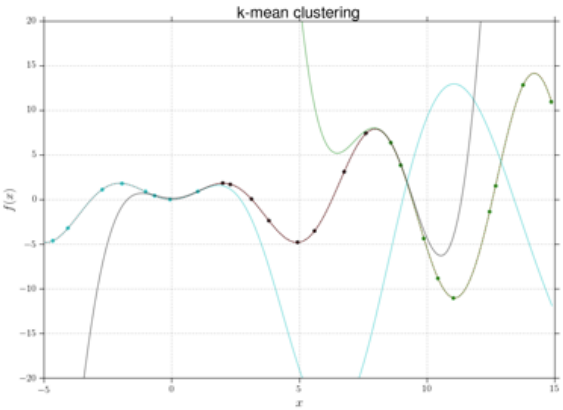
In this episode of "Research Worth Noticing" an article on the work of PhD student Bas van Stein on Kriging for Big Data. Bas is working on the Promimooc- project: Process mining for Multi Objective Online Control (TataSteel, BMW, CWI)

Kriging or Gaussian Process Regression is an elegant kernel based regression model that is capable of successfully modeling very complex functions, in many fields, such as quality of production processes. One of the major bottlenecks of Kriging is the complexity in both processing time (cubic) and memory (quadratic) in the number of data points.



A Kriging model is able to predict unseen records and to provide a predicted mean and variance, the so called Kriging variance, which can be seen as the confidence range of the prediction. The Cluster Kriging methodology uses a divide and conquer technique to split a large dataset into several smaller datasets. On each dataset a Kriging model is trained and unseen records are predicted using a weighted combination of a subset of the Kriging models.

The first algorithm using this methodology is the Optimal Weighted Cluster Kriging algorithm (OWCK). The algorithm uses a hard clustering technique such as K-means, to partition the dataset into k clusters and trains a Kriging model on each of these clusters. An unseen record is predicted by combining the predictions and predicted variances provided by each model in an optimal weights procedure. This optimal weights procedure minimizes the predicted variance and therefore maximizes the precision of the combined prediction, using the fact that each model is strictly independent of each other.



OWCK example, each color is a different Kriging model using a subset of the data. The combined model represents the original function.

Our experiments show that the Cluster Kriging approach outperforms other existing Kriging approximation methods and is able to even outperform the standard full Kriging model due to the more fine-grained local models.
The Cluster Kriging approach can be applied on large datasets , offline and online (real time), and has the potential to replace existing models such as support vector machines en random forests, including an indication of the quality of the predictions.

Read more >

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