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Efficient use of cloud computing for geospatial data processing in the Internet of Things

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Internet of Things (IoT) and cloud computing technology are advancing digitization and efficiency across application domains. Sensor technology provides insights into system performance and other observables. Sensor devices range from simple electronics to highly sophisticated multi-spectral cameras capable of measuring earth surface reflectance in different spectral bands. Such remote sensors can be carried by drones or satellites to produce streams of geospatial data. A satellite such as Sentinel-2, with revisit times of 5-10 days, delivers open data that surpass gigabytes volumes per week for a region as Denmark. Open satellite data is provided in downloadable bulks and calls for efficient processing with the aim of gaining new knowledge. In this talk, I present results from a feasibility study on the use of elastic cloud computing that efficiently provides data analytics based on bulks of satellite data from multi-spectral camera sensors. The performance of the processing cloud infrastructure is analyzed with the aim of determining a cost optimal elastic cloud computing infrastructure. The infrastructure is based on Open Geospatial Consortium (OGC) standards and OpenSensorHub is used to provide a dynamic sensor web application from the combination of geospatial maps and time series data. Furthermore, I present an efficient caching mechanism that minimizes the need for data downloads. The cloud infrastructure allows us to prepare knowledge gained from data and present this to stakeholders in a cost-efficient manner. Results from a case study in precision agriculture demonstrate several conceivable applications of calculated vegetation indices such as field classification and harvesting detection.

Biography

Rune Hylsberg Jacobsen holds MSc degree in Physics and Chemistry in 1995 and PhD degree in Optoelectronics in 1997 from Aarhus University, Denmark. He has been an Associate Professor in Electronics and Computer Engineering section at Aarhus University since 2010. His professional career furthermore includes 15 years in the telecommunication industry, where he has managed research and development products and teams. His main research interests include "Wireless networking, network security, smart grid communication and distributed computing for the Internet of things". He is the author of more than 50 scientific papers and has been speaker at several conferences.

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