

УДК 681.586+004.087+004.6

REDUCING THE DIMENSIONALITY OF REAL-TIME SENSOR DATA



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Abstract. In many scientific field such as oil & gas, physics, or weather analysis, as well as in domains such as security or risk assessment, massive amounts of sensor generated measurement data is produced that has to be analyzed and mined to gain insights. The actual data is collected over time and the vast amount of observations lead to a collection of ordered data on a time line. Traditionally, time series data reflects high-dimensional data that requires large amounts of memory and storage space. In oil & gas, data collected on rigs may exceed the capacity potential of the network link (for uploading the data), as well as the actual local storage that is available. Hence, the traditional approach of defining machine learning algorithms that operate on the stored datasets is not feasible. This talk focuses on bringing machine learning to the source (sensors) and so reduce the dimensionality of the data in flight. The major challenge is to represent the meaningful information of the time series' data via a low-dimensional representation while capturing the essence of the data pattern in flight.

Key words: sensor data, analys, massive, dimensionality

Bio. Dominique Heger has over 30 years of IT and analytics experience, focusing on systems modeling, performance evaluation, and capacity planning. Further, he specializes in Predictive Analytics, as well as Artificial Intelligence, Machine Learning, Robotics, and Deep Learning related projects. He is the owner/founder of DHTechnologies (www.dhtusa.com), an IT performance consulting firm, Data Analytica (www.mlanalytica.com), a Big Data and Predictive Analytics company, as well as Hotshot Analytics (www.hotshotanalytics.com), a AI/ML firm that focuses on robotics and sports analytics. All 3 companies are headquartered in Texas. He has successfully conducted large-scale IT, AI/ML, robotics, and Big Data projects for companies such as Boeing, AT&T, LLNL, NERSC, Dell, QLogic, Wells Fargo, EBay, EOG Research, Google, Nvidia, ESPN, Oceanering or CERN. Prior to DHT, Data Analytica, and Hotshot Analytics, Dominique worked for IBM, Hewlett-Packard (at CERN in Geneva), and Unisys. Over the years, he has published over 40 papers and books with IEEE, CMG, or the IBM Press. He holds an MBA/MIS from Maryville University St. Louis, and a Ph.D. in Information Systems from NSU, Florida. Next to his work in computer science, he very much enjoys spending time with his family, training horses in the Texas Hill Country and the cowboy sport of team roping