

Development of Ontology-based database and search engine for gas turbine operation and maintenance history

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Siemens Industrial Turbomachinery AB (SIT AB) in Sweden is part of the Siemens Energy Sector. The Energy Sector is the world's leading supplier of products, services and solutions for the generation, transmission and distribution of power and for the extraction, conversion and transport of oil and gas. SIT AB delivers gas turbines, steam turbines, turn-key power plants, service and components for heat and power production. All under one roof – from research and development, manufacturing, marketing, sales and installation of turbines and complete power plants to service and refurbishing. There are today about 2 700 employees in Finspång.

Project Field Experience In SIT AB, a large amount of field experience data is continuously generated in form of various reports from maintenance events, component repair and operation history. These reports include detailed information about the turbine operation history as well as its condition and reported damages on individual components. This field experience data, although noisy, invariably portray environmental factors, measurement errors, and loading conditions, or in short, reality. By establishment of a process to collect and maintain this information in a database format, exploration and knowledge discovery using this data became a subject of high interest. This Master thesis is a part of efforts done to develop advanced visualization tools together with the proper sequence mining algorithms to discover the hidden relationships between different events and all the other affecting variables like loading, configuration and environmental parameters.

Project description

Within the rotating equipment, such as gas turbines, there are critical components like turbine blades which have limited life time based on hours and cycles. Due to criticality, these components are traced and their condition is evaluated regularly at the maintenance events.

The history of installation, inspection and removal of these components together with all the other relevant information, such as design generation number, serial number, observed damages and final judgement about the health of the components is stored in a SQL relational database.

However, the task of data extraction, transferring, aggregation and loading to other analytical application or graphical user interfaces has been challenging and time consuming. In addition, the domain experts who are the users of this data are not the database experts so the intention is to build a search engine based on their own terminology.

The idea of this project is to establish the ontologies for this domain and use it to automate ETL jobs and data queries. The project is suitable for 1 student with good knowledge in database design, semantics and ontologies. Student will work closely with domain experts.

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