INTELLIGENT TWITTER ANALYSIS

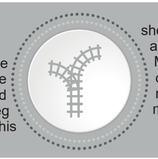
This project focused on investigating the premise of whether positive emotions in tweets about listed companies are related to their share price performance. During the four-month observation period a verifiable correlation between share prices and emotions in the tweets was established. These findings were obtained, among other things, through the use of sentiment analyses and deep neural networks.

ANNA - VIRTUAL PRODUCTION ASSISTANT

ANNA primarily supports domain experts. It brings together the entire know-how from the production, processes, configuration, orders and the tools of all machines.

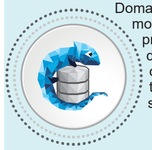
New knowledge is generated from this using data and visual analytics in order to derive cause-effect relationships. This makes it possible, for example, to reduce the failure probability of individual components or increase productivity by reducing unplanned machine downtimes.

INTELLIGENT RAILWAY SWITCH



Fundamental knowledge that should enable the generation of a digital image showing the condtion of a railway switch was developed together with voestalpine Signaling Zeltweg GmbH in the research project iTPP 4.0. This should be able to reliably predict future wear and tear or defects of the points at any time. Machine learning algorithms derive decisions on planned maintenance from data from railway infrastructure sensors in a self-learning manner.

ONTOLOGY-BASED DATA INFRASTRUCTURE



CALUMMA is a new generation of data management software that combines data complexity, interface diversity and visualization with user-friendliness. Domain experts are supported by the modeling, integration, validation, processing and evaluation of their data. Due to the genericity of the complete system, the application can be adapted to different scenarios and data.

MEDICAL IMAGE PROCESSING, MODELLING AND SIMULATION

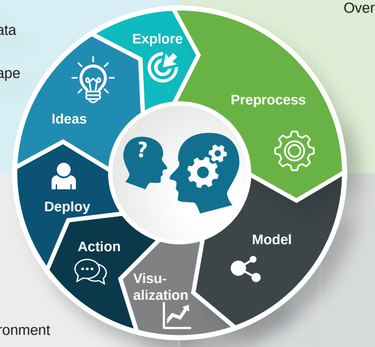
Although large amounts of medical image data are generated in the daily clinical routine, their use for automatic analysis methods is often difficult due to the lack of additional information (e.g., shape and position of the aorta, location of the tumor). Manual creation is very time-consuming and publicly accessible data sets are rare. In the MIMAS research area, research is therefore being carried out on automatic methods that enable the rapid generation of this additional information.

BRAINSTORMING

Preparation of questions
Collecting and providing data
Data exploration
Creating a solution landscape

DATA

Overview and understanding
Merge and prepare
Safety aspects
Clean and validate
Resampling
Correlation analysis
Feature engineering



OUTCOMES

Validation
Analysis
Interpretation
Visualization
Knowledge generation
Use in the production environment
Prescriptive Analytics

MODEL

Applied statistics
Mathematical methods
Optimization
Machine learning
Deep learning
Visual analytics
Domain knowledge

RISC Software GmbH
Softwarepark 32a | 4232 Hagenberg | Austria
office@risc-software.at | www.risc-software.at

Your contact person:
Robert Keber
robert.keber@risc-software.at

RISC Software GmbH | JOHANNES KEPLER UNIVERSITY LINZ

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DATA ANALYTICS

Successful Use of Data Analysis in Industry and Production, Trade and Healthcare

RISC Software GmbH

SMART DATA ANALYSIS AND FORECASTING

Digitalization and automation entail extensive data acquisition in a wide variety of sectors such as industry, commerce and healthcare. As a result, large amounts of data must be stored securely and processed in a way that is beneficial to the user in order to derive valuable information from them.

From an ICT perspective, the basis for **knowledge generation** is the digitized know-how of domain experts and the associated optimization of business and production processes. By applying statistical methods, modern **data and visual analytics** methods, as well as **machine learning**, the existing knowledge is analyzed in context with the recorded data. This allows anomalies and patterns to be subsequently identified and additional information to be derived through correlations for error and cause analysis. Using methods from the field of **artificial intelligence**, knowledge is generated and recommendations for action are formulated for experts (**expert-in-the-loop**).

RISC Software GmbH has already gained a lot of experience through research and development projects as well as numerous projects with industry in various areas of data management and analytics with small and large amounts of data. With this know-how, RISC Software GmbH supports its customers in preparing for new challenges by providing a better insight into their own data.

ISSUES

INDUSTRY AND PRODUCTION

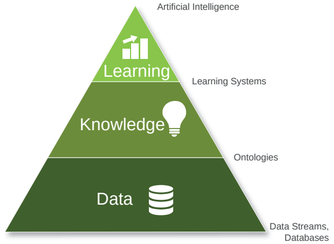
- How can I minimize the downtime of my machines?
- When should parts be replaced and what does a maintenance plan look like?
- How does the quality of my products develop and on which factors does it depend?

TRADE

- How does the buying behaviour develop and which products do I advertise?
- Which advertising media and actions are effective?
- Are there regional or seasonal dependencies and how strong are the fluctuations?

HEALTHCARE

- How can I use AI assistance systems for early detection of clinical pictures?
- How can critical patients be identified at an early stage?
- What progress in recovery is achieved by different treatment methods and how can this be predicted?



1. Data Engineering

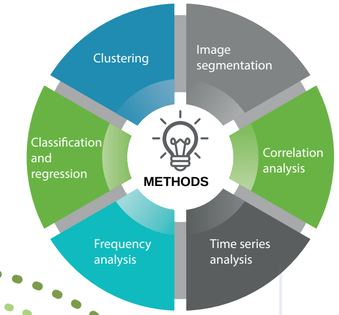
Machine, health, sensor or IT infrastructure data are generated on the most diverse levels and systems. In order to use these data, they must be intelligently combined, filtered and linked. Checking the correctness and completeness of the data is also relevant. Existing IT infrastructures must also be included, thereby making data security and quality indispensable.

- ✓ *Development of data models*
- ✓ *Automation of data import*
- ✓ *Extraction of complex features from medical image data*
- ✓ *Use of modern Big Data technologies for large amounts of data*
- ✓ *Use of common industry standards e.g., OPC UA*
- ✓ *Validation and verification of data*
- ✓ *Detection and correction of erroneous data*
- ✓ *Determination of training and evaluation data*

2. Data Analytics and Artificial Intelligence

In order to gain knowledge from collected and filtered data, mathematical, statistical and artificial intelligence methods, as well as visual analytics are used. By using selected algorithms, large amounts of data are examined for correlations and patterns. Models are created to answer various questions. Interrelationships, connections and laws in the data can contain important information, on the one hand, for short-term reactions in real-time operation and, on the other hand, for effective predictions for the future.

- ✓ *Data modeling and mapping of domain knowledge*
- ✓ *Model development*
- ✓ *Data preprocessing and validation*
- ✓ *Feature engineering*
- ✓ *Explorative data analysis and visualization*



3. Data Presentation

The visual processing of data and analysis results is an important tool for gaining new insights. An essential factor for the interpretation of analysis results is the strong involvement of domain experts. In addition, intuitive perception and the ability to combine are essential factors in the visualization of the results. The interaction between human expertise and machine processing can contribute significantly to the support of the decision-making process.

- ✓ *Visualization of models and analysis results*
- ✓ *Individual dashboards*
- ✓ *Web-based front-end*
- ✓ *REST-API for connection to external systems*
- ✓ *Connection to reporting tools*
- ✓ *Integration of solutions into existing systems*