



INTELLIGENT SERVICE TICKET SYSTEM TOWARDS OPTIMISATION

AI-supported assistance can optimise cooperation in industrial manufacturing and support the troubleshooting. In addition to ticket allocation (module 2), this optimisation already affects the service notification (module 1) as well as the subsequent processes up to the prerequisites for automated service reports (module 5).

The cooperation of different teams in industrial manufacturing, for example machine operators and service technicians, poses various challenges with regard to the precise description of maintenance tasks that occur, the request for suitable maintenance teams and the transfer of existing knowledge. These challenges are addressed by the Intelligent Service Ticket System (ISTS).

FOR THE FOLLOWING CHALLENGES

- AI-supported assistance in describing occurring errors and filtering for frequent or similar errors
- Intelligent search of textual, historical information (tickets on occurring errors and associated solutions)
- AI-supported classification of types of disorders
- Optimising cooperation between different teams of employees

THE USE CASE

Malfunctions in machines in industrial manufacturing can have a wide variety of causes, such as mechanical, electrical, hydraulic or pneumatic. Depending on the size of the operation, there are specialised troubleshooting teams for each error class. In this context, inexperienced or new staff in particular may find it difficult to accurately describe an observed error and subsequently request the correct team of service technicians to rectify it.

To address this issue, inovex and ESW have developed the AI-supported intelligent service ticket system as part of the Service-Meister project. This service actively supports the precise description of errors and makes it possible to include historical service tickets in order to automatically complete error descriptions or identify similarities between problem descriptions/solutions.

In addition, the ISTS can also classify service tickets to assist in requesting the right service team. Service technicians also have direct access to historical information on error solutions with similar error descriptions via an AI-supported search when processing service tickets. This helps to identify solutions and create service reports.

THE SOLUTION IN DETAIL

A Natural Language Processing (NLP) model is used to assist with the input of the error description. This is based on AI concepts previously developed in the Service-Meister speedboat inovex / KROHNE and has been significantly improved in the inovex / ESW speedboat projects.

Multi-class classifiers of supervised machine learning are used to classify the error classes, which are trained with the help of vector embeddings.

Unsupervised learning algorithms are used to identify similar and frequently occurring problems, whereby the models used here are also trained with the help of vector embeddings.

AI-supported functionalities realised in this way are made available to users via a web-based front end. This allows both the creation of new service tickets and the editing and assignment of existing tickets.

PROJECT STATUS

The service is fully implemented with all planned functionalities and is currently being prepared for the field test at ESW in manufacturing.

REQUIREMENTS

- Initial training of staff on the use of ISTS is necessary.
- A cloud infrastructure is required to deploy and operate the system

AVAILABILITY

Trained models and information on the developed infrastructure are available upon request and can be customised for the given use case.



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SPECIFICATION

	Input data	Preprocessing	Data storage	Algorithms	Interfaces
High-Level Description	Maintenance reports and troubleshooting information	Stemming, lemmatisation, anonymisation, autocorrection	Cloud-based database and storage accounts	Word2Vec, Naive Bayes, Multi-Class Classifiers, OPTICS, other	Web frontend for creating, editing and overwriting service tickets
Configurability	Freely configurable web frontend for recording with specific User-Accounts	Preprocessing modules to be applied are freely selectable	Instance and account selection freely configurable via individual credentials	Hyperparameters and fine-tuning of the data base	Different roles and permissions for display and editability
Technical Implementation	Web frontend with connected Postgres DB, Python script for initial filling with historical information	Python script, locally executable before cloud upload	Postgres DB, GCP Buckets	Python-based backend with Flask API, model versioning in MLflow, generic deployment via Docker Container	Flutter Frontend in Google-Cloud Container
Specific example from the speedboat project	Description of a specific malfunction on a punching machine including the subsequent solution for rectifying the malfunction	Service tickets and solutions are processed automatically and cleaned before upload to the cloud	Similar tickets and solutions to current new errors persist in the Postgres DB. They can be searched and made available.	On the basis of a given description of a problem, similar problems and their solutions are identified. In addition, the problem class is determined using supervised classification.	Service technician uses frontend to identify solutions for a current error ticket based on similar cases.



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