

Tracking Down Fraud with Algorithms and AI



Over the past few years, the “Billing Audit and Conspicuity Detection” business area has developed a level of expertise that is probably difficult or impossible to find elsewhere. Two scientists play a special role in this: Dr. Stefanie Schwaar, Business Unit Developer “Billing Verification” and Dr. Elisabeth Leoff, Deputy Head of the “Financial Mathematics” department. Their work focuses on traditional methods and modern AI or machine learning for detecting anomalies.

The young team is working on sophisticated methods and software tools for auditing accounts and has already established itself in sectors such as the automotive industry, care and health, and public administration.

Effective Prosecution of Care Fraud by Automated Image Processing), which is funded by the BMBF within the framework of the “Forschung für die zivile Sicherheit” program, ITWM researchers from two departments support prosecution with modern algorithms of artificial intelligence (AI) in the field of image as well as text recognition. It is carried out in cooperation with the Leipzig Police Department and the General Prosecutor’s Office in Dresden.

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Research project: an AI tracking dog for billing in the care sector

Billing fraud and corruption in the healthcare sector cause major damage to social insurance schemes. This results in enormous costs of several billion euros per year for the taxpayer. Up to now, it has been very time-consuming to accurately check the accounts of care services and contract physicians, and detecting fraud has involved a great deal of complex, manual paperwork. At the same time, due to the particular situation in care (dementia patients, many “small” services), it is difficult to prove a complaint for individual services. In the joint project “PflegerForensik – Effektive Strafverfolgung bei Pflegebetrug durch automatisierte Bildverarbeitung” (Care Forensics –

The core objective of the project is to develop algorithms for the automatic scanning and intelligent evaluation of mountains of paper. This is because every nursing service has its own paper documents, they are structured differently and often not everything is available digitally. Some of them are handwritten, some are tables, some are not. So automated checking is a real challenge. “So far, the various documents have been manually transferred to tables and checked. Image processing can automate a lot of this. Intelligent algorithms can capture both the document

structure and the content. For example, signatures can be found in documents and assigned to the correct employees,” explains Dr. Henrike Stephani, deputy head of the “Image Processing” department at Fraunhofer ITWM.

Machine learning method supports smart fraud detection

The accounting documents are an interplay of performance records, tour and duty schedules and other documents. These have to be combined during the inspection in order to detect fraud. “A conspicuous feature can be, for example, that many of the nurse’s services were billed at the same time in the service record, but the duty roster only lists a short assignment. We need to find such peculiarities in an automated way,” Leoff said.

Machine learning (ML) methods are used in the research project – more precisely, deep learning methods. With the help of so-called “supervised learning”, the algorithm learns from a mixture of real and artificially generated data to first recognize crucial information and then detect anomalies. To train these AI algorithms, the ITWM team designs a database and fills it with data. This means that several thousand documents must have been created by humans and marked with properties in order to make the algorithm intelligent at all. The algorithms are programmed and tested again and again with data from real investigation procedures. The evaluation is then based on the analysis of the documents and conspicuous features are automatically searched for.

But the work is not done with algorithms only: “In the end, we want to provide investigators with a software tool that helps to systematically uncover fraud cases more quickly. It must be easy for the public prosecutor’s office and the police to use and deliver results that are as reliable as possible. In addition, the computing time must not take too long, as the police

should be able to retrain the software independently for unknown formats. Which can often still be difficult with deep learning methods today,” Leoff emphasizes.

AI competencies are constantly being expanded

The business area is complemented by the six-member EP-KI team (EP-KI: AI decision support for business processes) around Stefanie Schwaar. This team also takes care of the development of smart AI processes for applications, but with a different target group. Many decisions in companies and administrations today are still based on manually evaluated data sets. The knowledge of many employees in companies remains with them and is rarely taken into account for future decisions. At the same time, public administrations, in particular, are facing a major technological upheaval which is leading to the digitization of numerous other processes. In this context, the AI junior research group supports companies and administrations.

The group, which is funded by the German Federal Ministry of Education and Research, focuses its research on future-oriented issues and their solution through application-friendly processes.

The fields of application are not limited to billing verification and fraud detection. Here, methods of explainability (Why is a bill conspicuous?) and prognosis (How is the development to be expected?) are also considered. They share more about their work and activities on the team’s website and blog.

 **More information on the “Accounting Audit” business unit**
www.itwm.fraunhofer.de/accounting-audit

 **To the EP-KI team blog** www.itwm.fraunhofer.de/epki-blog_en

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