

# PRESS RELEASE

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**BMBF joint Project PflegeForensik: Software supports Criminal Prosecution**

## **Using Artificial Intelligence to Combat Billing Fraud in the Care Sector**

**Fraud in the billing of outpatient care services has become a criminal phenomenon with increasing case numbers in recent years. This causes great damage to the social insurance system and results in enormous costs of several billion euros annually for the community of solidarity. Together with the Public Prosecutor's Office in Dresden and the Commissariat for Economic Crime of the Leipzig Police Department, researchers of Fraunhofer Institute for Industrial Mathematics ITWM are taking action against this. They are developing AI software against billing fraud in the »PflegeForensik« project. The work is funded by the German Federal Ministry of Education and Research (BMBF).**

Up to now, it has been very time-consuming to accurately check the accounts of nursing services and contract physicians; detecting fraud has involved a great deal of complex, manual paperwork. At the same time, the special situation in nursing care (patients with dementia, many »small« services) makes it difficult to prove a complaint about individual services. In addition, the greater the need for care, the more difficult it is for patients to check the accounts themselves and to report care services that have not been provided or have been provided incorrectly. In addition, the lack of transparency in the billing system makes it susceptible to manipulation. There are many aspects and levels that present challenges and hurdles.

### **Machine Learning Method Supports Smart Fraud Detection**

The joint project »PflegeForensik« (Care Forensics) with the subtitle »Effective prosecution of care fraud by automated image processing« is facing these challenges and is funded by the BMBF within the framework of the program »Research for Civil Security«. Researchers of Fraunhofer ITWM support law enforcement with modern algorithms of Artificial Intelligence (AI) in the field of image as well as text recognition.

The core objective of the project is to develop algorithms for the automatic reading and intelligent evaluation of the mountains of paper. Until now, every nursing service has

had its own paper documents, which are structured differently and usually have little digital content. Some of them are completed by hand, some are tables, others are continuous text. Automated checking is a real challenge. »Up to now, the various documents have been manually transferred to tables and checked. With image processing, you can automate a lot here. Both the document structure can be captured with intelligent algorithms, as well as the content. For example, signatures can be found in documents and assigned to the right employees,« explains Dr. Henrike Stephani, deputy head of the »Image Processing« department at Fraunhofer ITWM.

### **AI Sleuth for Billing in Nursing Care**

The billing documents are also an interplay of service records, tour schedules, duty rosters and other documents – these must be combined during the audit in order to uncover 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 have to find such peculiarities in an automated way,« says Dr. Elisabeth Leoff, deputy head of the »Financial Mathematics« department at Fraunhofer ITWM.

»Our joint research project is intended to shorten the time-consuming and labor-intensive evaluation of evidence by shifting the manual to an automated collection and evaluation of care service documents,« explains Steffen Leitte, public prosecutor at the Dresden General Prosecutor's Office. »This requires AI expertise and mathematics.«

Machine Learning (ML) methods are used in the research project, especially in the digital capture of the various document types. A combination of image processing methods and modern Deep Learning methods is used. Various algorithms learn from a mixture of artificial and anonymized real data first to recognize crucial information and then to detect anomalies. In order to train these AI algorithms, a database is filled by the ITWM team and the Leipzig police department. This means that several thousand documents must have been created by humans and marked with properties in order to make the algorithm intelligent in the first place. The algorithms are programmed and repeatedly tested and improved with data from real investigative procedures. The analysis of the documents then forms the basis for the evaluation and detection of conspicuous features.

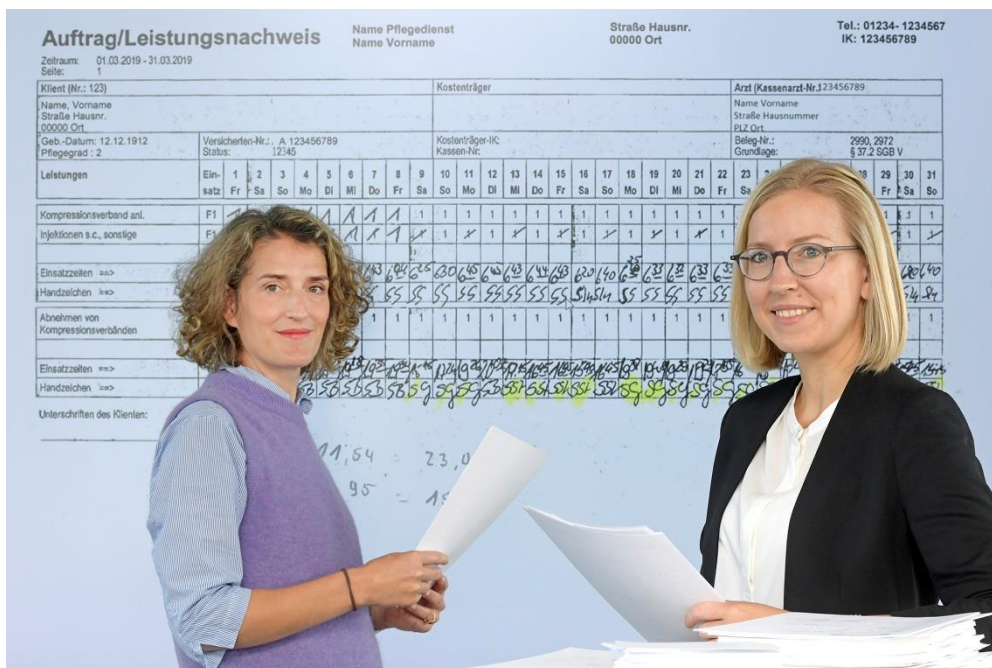
### **Software Simplifies and Accelerates Work of Law Enforcement Agencies**

But the work is not done with algorithms alone: »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 to use for the public prosecutor's office and the police, and it must deliver results that are as reliable as possible. In addition, the computing time

**FRAUNHOFER-INSTITUT FÜR TECHNO- UND WIRTSCHAFTSMATHEMATIK ITWM**

must not be too long, as the police should be able to quickly retrain the software independently for unknown formats. Which can often still be difficult with Deep Learning methods today,« Leoff emphasizes.

The research project started on 01.01.2021 and will run for two years. Initial work results already show significant project progress towards a software that will simplify the work of law enforcement agencies in the future, but can also be used by health and long-term care insurance companies to check billing records.

**Image Material**


The two researchers Dr. Henrike Stephani and Dr. Elisabeth Leoff of Fraunhofer ITWM in front of an anonymized test object.

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**About the Fraunhofer Institute for Industrial Mathematics ITWM**

The Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern is one of the largest research institutes for industrial mathematics worldwide. We see our task in further developing mathematics as a key technology and providing innovative impetus. Our focus is on the implementation of mathematical methods and technology in application projects and their further development in research projects. The close cooperation with partners from industry guarantees the high practical relevance of our work.

Their integral components are consulting, implementation and support in the application of high-performance computer technology and the provision of tailor-made software solutions. Our various competencies address a wide range of customers: automotive industry, mechanical engineering, textile industry, energy and finance. This also benefits from our good networking, for example in the High performance center "Simulation- and software-based innovation".