In the many and ever new areas in which Ruckdeschel now applies his expertise, suspected crimes, criminal investigations or substantial economic interests are quite often involved.

The Appeal of Numbers

His domain is statistics, but thanks to his expertise in this field he is active in a number of other fields too. Peter Ruckdeschel gives us a few insights into his research, the details of which are often confidential.

It was not your usual cowboy film. It was an epic documentary about the last cattle herder in Upper Franconia, some 20 years ago. Peter Ruckdeschel is a film enthusiast, because in this school of thought you never know whether a past event will be recurrent, reproducible in the future or whether it was just a one-off,” Ruckdeschel explains. Consequently, you try not to give too much weight to any single event, including the more extreme ones.”

This approach is also applied in fraud detection: “When you generate a procedure that picks out Uli Hoeness from thousands of tax files, it is doubtful that there will be another Uli Hoeness any time soon,” the statistician stresses. “In other words, it is doubtful whether a procedure tailored to the specificities of a small minority can be used to make predictions in other cases. And here the robust approach is more sceptical. It demands empirical evidence that such – or similar – cases won’t just occur once, but more often.”

“Tackle problems that actually come up”

Aside from isolated cases involving millions in dodged taxes the statistician is aiming for “a procedure that substantially improves on tax inspectors simply reaching blindly into the files.” Ruckdeschel elaborates: “It’s about being able to quantify more precisely how valuable the presence of a particular feature might be for identifying something as suspicious.” In this task, Ruckdeschel explains, he, along with many other experts, relies on the domain knowledge of experts in the respective field. This is crucial to avoid false alarms, as a computer easily needs to check thousands of features in order to sort tax returns, for example, into the more suspect ones and the less suspect, he explains.

To ensure that statisticians everywhere are able to make calculations according to the latest technical standards, for several years Ruckdeschel has also been involved in contributing to the statistics software “R”, together with many other experts. Using this open source software – “which is actually the computational foundation of what we are working with here” – together with his group, he is maintaining about 20 extension packages. When it comes to large data sets parallelization, i.e. dividing the workload among many computing units, helps to substantially reduce computation time, and “R” provides a powerful infrastructure to this end. “We have the necessary computing clusters here in Oldenburg so that a normal computer would take 100 days to perform can be completed in one and a half days.”

Large volumes of data are also the reason why Peter Ruckdeschel has been called in as an expert witness in lawsuits in cases of medical billing fraud. When the prosecution is not able to check each individual bill submitted for reimbursement, a carefully selected sample is decisive in helping to determine a lower confidence limit for damages with 99.5 percent certainty. This, too, requires the expertise of a statistician like Ruckdeschel who, together with other colleagues, is currently setting up the “Centre for Statistics in Oldenburg & Bremen” as a hub for other scientists from the two universities, as well as for businesses.

He has already started to create links between his research and a number of other disciplines in Oldenburg, for example healthcare research, biology, economics and the neurosciences. Statistics is a mathematician, he says, here, as in all domains, he relies on the domain knowledge of experts in the respective field. This is crucial to avoid false alarms, as a computer easily needs to check thousands of features in order to sort tax returns, for example, into the more suspect ones and the less suspect, he explains.

One day you’re working with a biologist, the next with a judge – it’s very varied. You have to constantly reassembly your ideas, but that’s what makes it so exciting.” (ds)