Joint News Release

BASF and TU Berlin launch artificial intelligence cooperation

Ludwigshafen/Germany and Berlin/Germany, August 14, 2019 – BASF and Technische Universität Berlin (TU Berlin) have signed an agreement to cooperate closely in the area of machine learning. The aim of the collaboration, Berlin-based Joint Lab for Machine Learning (BASLEARN), is to develop workable new mathematical models and algorithms for fundamental questions relating to chemistry, for example, from process or quantum chemistry. Both partners are jointly committed to this aim in the coming years. As essential part of the cooperation, BASF supports the research work of Prof. Dr. Klaus Robert Müller, professor for machine learning and spokesperson of the "Berlin Center for Machine Learning" at the TU Berlin, with a total of over €2.5 million over the coming five years.

Machine learning is a key pillar of artificial intelligence. With machine learning, large volumes of data are analyzed to recognize patterns and relationships which can be used to develop prediction models that optimize themselves based on their results. Systems for language recognition or autonomous driving are examples of how machine learning is used in day-to-day applications. "Ultimately, the mathematical models in these everyday examples are similar to those needed in a digitalized laboratory," explains Dr. Hergen Schultze, head of BASF's research group "Machine Learning and Artificial Intelligence."

"There is no off-the-shelf software for machine learning," says Dr. Bruno Betoni, who is responsible for BASLEARN at BASF. "Our goal is to develop new basic principles of machine learning for very specific applications in research. TU Berlin has a wealth of

expertise in this area," adds Betoni. He is convinced that this cooperation will help both partners make important progress. "We will benefit enormously from this cooperation with BASF," says Müller, "Through this cooperation, we get access to huge volumes of real, highly complex data, which we can use to develop new algorithms. The scientific questions being investigated by BASF are extremely interesting and diverse. Such real-life challenges create very exciting and novel research questions regarding machine learning that theoreticians sitting at their desks would rarely come up with."

The application areas for machine learning range from biological systems and research on materials and active ingredients to laboratory automation and dynamic process systems. The joint research work will investigate issues such as the solubility of complex mixtures or dyes as well as predicting the aging process of catalysts. "This may not sound very complicated at first, but unfortunately it is. For example, we know the solubility of individual materials and simple mixtures. However, when there are several components in a formulation it is a different story," says Schultze. "The more data we use and the better adapted a learning model is, the better it can predict. In turn, our work in the lab becomes more efficient and together we reach our goal more quickly," says Schultze. "Mathematical models can of course also control laboratory robots and thus carry out experiments," adds Schultze, citing another application example. Robots could thus take over routine tasks or dealing with hazardous materials, for example, during reactor cleaning.

This cooperation of BASF with TU Berlin already has positive role models: Since 2011, both partners jointly run a lab on the campus of the TU Berlin, which explores the basics of heterogeneous catalysis for raw material change. Furthermore, BASLEARN is not the first cooperation relating to artificial intelligence that BASF has entered into with external researchers, but it is the most extensive. The company is already working with Massachusetts Institute of Technology (MIT) and Stanford University. "Berlin is one of the hotspots for machine learning in Germany," says Betoni. "Due to this cooperation, the TU Berlin extends its top position in the area of artificial intelligence," Müller adds. The cooperation between BASF and TU Berlin could serve here as an incubator for further innovations and as a starting point for cooperation opportunities with highly innovative startups.

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About BASF

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About Technische Universität Berlin

The roots of Technische Universität Berlin and its predecessor institutions stretch back to the time of Frederick II, King of Prussia, during the 18th century. In its current form, Technische Universität Berlin was founded in 1946. Almost 35,000 young people from 147 countries are enrolled in over 120 bachelor's and master's degree programs here, where they pursue their education through close interaction between engineering and natural sciences, planning, social sciences, economics, and humanities with an eye to industry and the wider society. With its approximately 370 professors and some 20 spin-offs each year, Technische Universität Berlin is also an important economic driver and incubator of innovations in the German capital city region.