PRESS RELEASE

What To Do with All the Data?
Fraunhofer ITWM at the »Embedded World«

The amount of data produced at the edge worldwide continues to increase. This also increases the need for efficient data processing to reduce energy and infrastructure costs. The Fraunhofer Institute for Industrial Mathematics ITWM is working on a hardware-aware NAS (Neural Architecture Search) that brings together several promising technologies. At the »Embedded World« trade fair in Nuremberg, researchers from Fraunhofer ITWM will present their work at the joint Fraunhofer booth (Hall 4, Booth 422) from April 9 to 11, 2024.

At the leading international trade fair for embedded systems, the ITWM team will be demonstrating how it combines the trending topics of edge computing - i.e., the decentralized processing of data »at the edge of the network« - and machine learning. Here, the researchers are focusing primarily on deep neural networks (DNNs), which are very flexible and process a wide range of inputs, e.g., time series data and images.

Attempts to transfer off-the-shelf DNNs to an embedded system often fail because the models are too large if they have not been specially developed for the borderline case. This is where the Fraunhofer ITWM's solution comes in: the Neural Architecture Search Engine (NASE) searches for a DNN structure so that the DNN fits the hardware and fulfills the application goals.

Scalable method for fast solutions

»With NASE, we at Fraunhofer ITWM are developing a hardware-aware NAS,« explains project manager Dominik Loroch. »This type of search also takes into account the limitations of the hardware platform and finds solutions that run optimally. Those who want to use NASE only provide the data and need little to no knowledge of DNNs. Since both the search and the training are automatic, it's a very scalable way to quickly get solutions for the hardware.« NASE acts as a productivity booster that identifies optimized DNNs very quickly and thus significantly reduces development costs.

Award for AI hardware

The basis is an energy-efficient AI chip for which researchers at Fraunhofer ITWM received the Pilot Innovation Award from the Federal Ministry of Education and Research in 2021. »Back then, a new unifying methodology was developed to increase the energy efficiency of AI systems. At the same time, our methodology reduced the development time for optimized neural networks and corresponding FPGA implementations,« says Loroch. »We have continuously developed the expertise we acquired back then and can now transfer it to different industrial scenarios.«

Part of the joint Fraunhofer stand

The Fraunhofer ITWM can be found in hall 4, booth 422 at the Fraunhofer joint booth. There, other Fraunhofer Institutes will present current research work and solutions for embedded systems.

NASE – Neural Architecture Search Engine
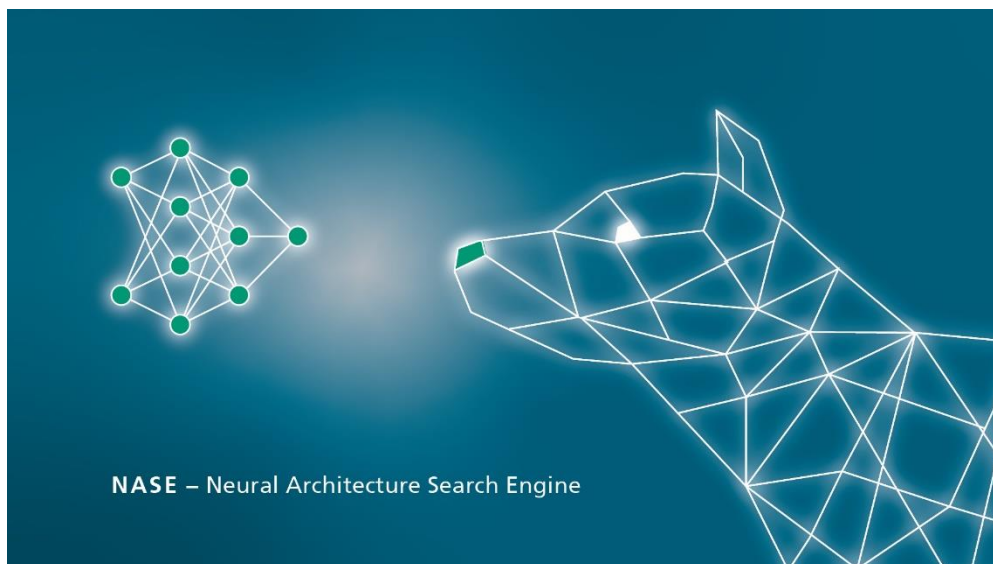
NASE detects the optimum DNN structure for the hardware and acts as a productivity booster.
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Further Information

www.itwm.fraunhofer.de/NASE

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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 applied mathematics in the world. We see it as our task to further develop mathematics as a key technology and to provide innovative impulses. 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 building blocks are consulting, implementation and support in the application of high-performance computing technology and the provision of customized software solutions. Our various areas of expertise address a wide range of customers: the automotive industry, mechanical engineering, the chemical industry, energy and the financial sector. This also benefits from our excellent networking, for example in the Simulation and Software-based Innovation Center.

About the Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft, based in Germany, is the world's leading organization for application-oriented research. With its focus on future-oriented key technologies and the utilization of results in business and industry, it plays a central role in the innovation process. As a guide and driving force for innovative developments and scientific excellence, it helps to shape our society and our future. Founded in 1949, the organization currently operates 76 institutes and research facilities in Germany. More than 30,000 employees, most of whom are trained in the natural sciences or engineering, work on the annual research volume of 2.9 billion euros. Contract research accounts for 2.5 billion euros of this total