Machine Vision with Quality control with AI

Laboratory and Competence Center The „Swarm-Based Logistics" laboratory and competence center at the Cooperative State University in Mosbach, Campus Bad Mergentheim / Baden-Württemberg (DE)

Research / Application: The application of swarm intelligence, particularly the adaptation of nature-inspired algorithms to logistics applications. | Deployment Period 2023

THE CHALLENGE

Prof. Dr. Carsten Müller researches the application of swarm intelligence, particularly the adaptation of nature-inspired algorithms to logistics applications. The focus of the first phase in research and teaching is machine vision as a key technology for the stable classification of objects and situations in the context of autonomous driving. In the subsequent phases, hybrid algorithms based on swarm intelligence and reinforcement learning will be integrated. Research questions to be explored include areas such as the distribution of capabilities, dynamic roles and responsibilities, behavior rules in different situations, and the interaction between autonomous delivery robots and humans.

"The fischertechnik model is powerful, smart, and intuitive to use, making it an excellent tool for teaching artificial intelligence.

Prof. Dr. Carsten Müller,
Lecturer

THE SOLUTION

In his research and teaching on artificial intelligence with a focus on machine vision, Professor Carsten Müller utilizes the powerful fischertechnik technology for „Quality Assurance with AI." „The combination of software and tactile feedback fosters understanding of artificial intelligence," explains Carsten Müller regarding his choice of fischertechnik. The fischertechnik Quality Assurance with AI comes with workpieces in various colors, each featuring three processing characteristics and various types of defects. These workpieces are scanned by a camera and classified and sorted using supervised learning based on color, characteristics, and defect type. The AI used is implemented with machine learning in TensorFlow, where an artificial neural network has been trained with image data. The trained AI runs on the fischertechnik TXT 4.0 controller, which provides suitable wireless interfaces for numerous applications. The model's sequence control is implemented in the Robo Pro Coding programming environment and in Python. Additionally, there is the option to program custom AI applications. Training is conducted through an algorithm based on Python, a versatile high-level programming language. An example project is available for training purposes.

THE RESULT

Understanding the complex processes of supervised learning clearly demonstrates how intelligent machines operate in industry. „The fischertechnik model is powerful, smart, and intuitive to use, making it an excellent tool for teaching artificial intelligence," explains Carsten Müller.

FIT FOR FUTURE WITH FISCHERTECHNIK!

The production of tomorrow is the focus of research, industry, and academia. It describes the transformation towards agility, customer orientation, artificial intelligence, and Industry 4.0. This gives rise to a multitude of challenges influenced by technological advancements, societal changes, and global trends. Addressing these challenges requires a holistic and proactive approach from companies that invest in innovation and employee training to successfully shape tomorrow's production and remain globally competitive.

Therefore, our approach is to understand the small before implementing on a large scale. With fischertechnik simulation models, you prepare yourself for the future, create sustainable learning experiences in vocational education and academia, overcome hurdles presented by seemingly complex transformations, and conduct research on future topics.

„The demonstration of the possibilities that artificial intelligence offers and how it will shape the future of technologies was a very clear and practical example for me."

Marcel K., Student

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