infopulse

Manufacturing
Company

Implementation of Convolutional Neural Network for Manufacturing Needs

AI-Based Device Recognizes Data from Old Gauges in Less than 2 Seconds

Client: Integrated innovation service provider | **Industry:** Manufacturing | **Location:** Germany | **Employees:** 50+

BUSINESS CHALLENGE

Many plants with continuous production still rely on **manual data collection from old gauges**. Installed years ago, they perfectly fulfill their main functions. Replacing such working equipment with the next-gen APIs **can result in large expenses**. Hence, manufacturers seek economically viable solutions to automate data retrieval and sending it to the cloud.

Our customer, known for its innovative digital initiatives, asked us to help with the development of a **Computer Vision and IoT solution for their metal manufacturing client**. It could automate taking readings of old gauge equipment, thus optimizing manufacturing performance and reducing human error. It is rather complicated to retrofit and integrate old legacy gauge equipment (weighers, thermocouples, barometers, sensors, etc.) into a modern IT ecosystem according to the process digitization requirements of Industry 4.0 / OPC Unified Architecture and IoT standards. We had to figure out how to quickly recognize data on gauge pointers or 7-segment display with a pocket-size device.

SOLUTION

Infopulse's R&D team trained a **convolutional neural network (CNN)** to instantly recognize digits on the customer's gauges despite image defects from 7-segment LCD display such as glares, white spots, reflections of objects or people, etc. To vary digits, our designers processed 10 GB of gauge images received from a manufacturer, their ad hoc image updates and studied other open source examples, ending up with **20 GB of images** for CNN building.

The team chose Theano & Keras open source tech stack as their Machine Learning Toolkit and performed one-time feeding of all images to a neural network on a powerful Amazon AWS Virtual Machine. Then, we started the actual training of a network including counting, discerning small and large numbers, transforming the pointer position on a circular gauge into specific digital value. Upon reaching the needed result, the compiled CNN was deployed to Raspberry Pi 3 device with the HD camera.

TECHNOLOGIES

| Raspberry Pi 3 | ARM32 | Theano | Keras | Python | AWS |

TECHNOLOGY DOMAINS

| Computer Vision | IoT | Embedded | Data Science |

BUSINESS VALUE

- AI image recognition is achieved in **less than 2 seconds** with a small handheld device.

- Received data is automatically stored in a database via Wi-Fi.

- MVP release was developed in 2 weeks whereas **production-ready system was released in 3 months** by the Infopulse team of two engineers and one architect.

- We helped the customer **save development costs** by utilizing Theano & Keras free and open source software (FOSS).

- Achieving **high fault tolerance** due to the reliability of chosen hardware and developed bug-free software.

- On top of that, after reaching one customer, the developed solution made interested other huge clients, such as **automotive and beverage producers**.

ABOUT INFOPULSE

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