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Editorial

Applications of Computer Science in Agricultural Engineering

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Agricultural engineering is the branch of engineering that deals with the design and exploitation of farm machinery and devices; the location and planning of farm structures; farm drainage, soil management, and erosion control; water supply and irrigation; rural electrification; farm product processing; and deriving renewable energy from agricultural products. Computer science is necessary for engineering, especially in agricultural engineering, to solve current engineering problems.

This Special Issue focus on the application of computer science in agricultural engineering regarding system and process modelling, computer simulations, process optimisation, Artificial Intelligence, and device and machine design.

A total of fourteen papers (thirteen research papers and one review paper) in various fields of agricultural engineering are presented in this Special Issue. Several articles examine modelling (the process of drying and rehydration of agricultural products, photosynthesis, and the agricultural machinery service system). Tulej and Głowacki [1] modelled the drying process of apple pomace using mathematical models: the model of Page and a model of the drying kinetics of solid body molecules, considering the shrinkage of the particles. Golisz et al. [2] described the leek drying process and applied a probabilistic model of the drying kinetics of solids with consideration of the shrinkage. Górnicki et al. [3] applied seven empirical models, artificial neural networks, rehydration indices, and colour variations (total colour difference) to the description of changes in dried apple characteristics during their rehydration. Borowski et al. [4] developed and successfully used a mathematical model for determining the time of preventive replacements in the agricultural machinery service system with minimal repair. García-Rodríguez et al. [5] performed mathematical modelling to estimate photosynthesis.

The issue of optimisation has been discussed in several articles in the present Special Issue. Zhang et al. [6] conducted optimisation studies on the power consumption of a typical rotary tillage soil blade. Trajer et al. [7] optimised water consumption in fruit and vegetable processing.

In several articles of the present Special Issue, Artificial Intelligence was applied. The Artificial Neural Networks were used by Górnicki et al. [3] for the rehydration process description, Trajer et al. [7] in the analysis of water consumption in fruit and vegetable processing plants, Sun et al. [8] for plant diseases identification (Discount Momentum Optimizer based), Han et al. [9] for trajectory tracking control of a manipulator (based on an adaptive neuro-fuzzy inference system), Xu et al. [10] for image recognition of agricultural pests (Deep Learning based), Liu et al. [11] for buckwheat disease recognition (Convolution Neural Network based), and Ma et al. [12] used Machine Learning Models for the hyperspectral estimation of nitrogen content in the leaf of wheat.

Computer simulation also was applied in the present Special Issue. The numerical simulation of airflow distribution in a pregnant sow piggery was performed by Wei et al. [13]. In contrast, Zhang et al. [6] provided the computer simulation of soil cutting of a rotary tillage soil blade.

Janaszek et al. [14] developed a biospeckle-based sensor (early stage of blueberry fruit infestation by D. suzukii) that could be used as a diagnostic tool in post-harvest fruit sorting.

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Although submissions for this Special Issue have been closed, more in-depth research in the field of using computer science in agricultural engineering continues to address the challenges we face today and/or will face future.

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