



Smart Spatial Analyses in Land Levelling Development and Evaluation of Models for Tractor Performance Parameters

JAMIL ASAAD

University of Damascus, Syria

Abstract:

The objective of this research was to develop two methods of computational intelligent (CI) techniques, namely, artificial neural network(ANN) and adaptive neural fuzzy inference system (ANFIS).Furthermore, to develop mathematical model using Design Expert software for modeling and predicting performance parametersof theMassey Ferguson (MF-285) tractorunder various field conditions. In this study a MF-285 tractor was instrumented with a low cost and precise data logging system as a means of recording and monitoring the affectual parameters on performance of tractor such as forward speed and instant fuel flow rate during field operation. A moldboard plow was used as tillage tool during the experiments under various tillage depths, engine speeds, forward speeds, tire inflation pressures, moisture contents and cone indexes. Acquired data were used to develop accurate models for drawbar pull, rolling resistance, slippage, Temporal Fuel Consumption (TFC), Area-specificFuel Consumption (AFC), Specific Fuel Consumption (SFC), drawbar power, axle power, net traction ratio, tractive efficiency and power loss. The results showed that all developed models (ANN, ANFIS and mathematical) had satisfactory performance for predicting aforementioned parameters of tractor in various field conditions. For drawbar pull, ANN technique achieved optimum model with topology 6-8-1 andLevenberg-Marquardt learning method with MSE of 0.000515 and R2 of 0.997. ANFIS method produced the best model with indicators statistical MSE of 0.00541 and R2 of 0.979 for rolling resistance. The premium model for anticipating slippage achieved by ANN with topology 6-8-1 and Bayesian regulation with MSE of 9.3621e-08 and R2 of 0.9999.For drawbar power, the best result was obtained by the ANN with 6-7-1 topology and Bayesian regulation training algorithm with R2 of 0.995 and MSE of 0.00024.

Biography:

Isham Alzoubi currently works at the Department of Ag-



ricultural Machinery Engineering, University of Tehran. Isham does research in Analysis, Applied Mathematics and Probability Theory. Their most recent publication is 'Prediction of environmental indicators in land leveling using artificial intelligence techniques'.

Publication of speakers:

1. Alzoubi, Isham & Almaliki, Salim & Mirzaei, Farhad. (2019). Prediction of environmental indicators in land leveling using artificial intelligence techniques. Chemical and Biological Technologies in Agriculture. 6. 10.1186/s40538-019-0142-7.
2. Mirzaei, Farhad & Delavar, Mahmoud & Alzoubi, Isham & Arrabi, Babak. (2018). Modeling and predict environmental indicators for land leveling using adaptive neuro-fuzzy inference system (ANFIS), and regression. International Journal of Energy Sector Management. 12. 10.1108/IJESM-02-2017-0003.
3. Alzoubi, Isham & Delavar, Mahmoud & Mirzaei, Farhad & Arrabi, Babak. (2018). Prediction of environmental indicators in land leveling using artificial intelligence techniques. Journal of Environmental Health Science and Engineering. 16. 10.1007/s40201-018-0297-3.
4. Alzoubi, Isham & Delavar, Mahmoud & Mirzaei, Farhad & Arrabi, Babak. (2017). Comparing ANFIS and integrating algorithm models (ICA-ANN, PSO-ANN, and GA-ANN) for prediction of energy consumption for irrigation land leveling. Geosystem Engineering. 21. 1-14. 10.1080/12269328.2017.1372225.

[International Conference on Humanoid Robotics, Artificial Intelligence and Automation | May 21, 2020 | London, UK](#)

Citation: JAMIL ASAAD; Smart Spatial Analyses in Land Levelling Development and Evaluation of Models for Tractor Performance Parameters; Humanoid 2020; May 21, 2020; London, UK