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Approximation of multi-parametric functions using the differential polynomial neural network. (English) Zbl 1372.68228

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Summary: Unknown data relations can describe a lot of complex systems through a partial differential equation solution of a multi-parametric function approximation. Common artificial neural network techniques of a pattern classification or function approximation in general are based on whole-pattern similarity relations of trained and tested data samples. It applies input variables of only absolute interval values, which may cause problems by far various training and testing data ranges. Differential polynomial neural network is a new type of neural network developed by the author, which constructs and resolves an unknown general partial differential equation, describing a system model of dependent variables. It creates a sum of fractional polynomial terms, defining partial mutual derivative changes of input variables combinations. This type of regression is based on learned generalized data relations. It might improve dynamic system models a standard time-series prediction, as the character of relative data allows to apply a wider range of input interval values than defined by the trained data. Also the characteristics of differential equation solutions facilitate a great variety of model forms.

Reviewer: Reviewer (Berlin)

MSC:

68T05 Learning and adaptive systems in artificial intelligence
35Q68 PDEs in connection with computer science

Keywords:

polynomial neural network; data relations; partial differential equation construction; multi-parametric function approximation; sum derivative term

Full Text: DOI

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