Title: Voltage stability prediction on power system network via enhanced hybrid particle swarm artificial neural network

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Abstract: Rapid development of cities with constant increasing load and deregulation in electricity market had forced the transmission lines to operate near their threshold capacity and can easily lead to voltage instability and caused system breakdown. To prevent such catastrophe from happening, accurate readings of voltage stability condition is required so that preventive equipment and operators can execute security procedures to restore system condition to normal. This paper introduced Enhanced Hybrid Particle Swarm Optimization algorithm to estimate the voltage stability condition which utilized Fast Voltage Stability Index (FVSI) to indicate how far or close is the power system network to the collapse point when the reactive load in the system increases because reactive load gives the highest impact to the stability of the system as it varies. Particle Swarm Optimization (PSO) had been combined with the ANN to form the Enhanced Hybrid PSO-ANN (EHPSO-ANN) algorithm that worked accurately as a prediction algorithm. The proposed algorithm reduced serious local minima convergence of ANN but also maintaining the fast convergence speed of PSO. The results show that the hybrid algorithm has greater prediction accuracy than those comparing algorithms. High generalization ability was found in the proposed algorithm.