Prediction of wind speed

Abstract

The Kanban cell neuron (KCN) applies to weather numerical prediction (WNP) of wind speed from temperature, relative humidity, and barometric pressure. The KCN is an AND-OR gate in the linear formula of (ii*pp)+qq = kk. Extrema values as minimum and maximum for each variable are searched in the data set[1] for each of the previous 24 hourly values. The first step is to normalize the respective minimum value to zero using a normalizer, to mean normalized values are equal to or greater than zero. The second step is to scale the range of values to a fraction of 1 using a scalerizer ratio. The third step is that variables are input for the hour (hr) before the desired hr of the predicted wind speed. The fourth step is that KCN output value is then applied to the wind speed of that previous hr to predict the wind speed of the next hr of interest. The KCN-predicted wind speeds by date and hr are the expected values, with the actual wind speeds as the observed values. The initial *indirect* test of soundness is for the actual wind speed with an arbitrary ±2.0 km/hr as the expected values, with the actual wind speeds as the observed values from only Step 3 above. For a test range greater than (outside of) ±2.0 km/hr, the KCN non-prediction rate (530) is 71% lesser than for the non-KCN non-prediction rate (746). In other words, the KCN-prediction rate is 141% greater than for the non-KCN prediction rate. The approach for *direct* statistical analysis of predictions uses the N-by-M contingency test (a superset of the χ^2-test). For df 718, the WNP by KCN is χ^2 1002.942 with Fisher P ≤ 8.9003221e-12. The soundness test predicting +2.0 km/hr from the previous hour is χ^2 334.17806. The soundness test predicting -2.0 km/hr from the previous hour is χ^2 380.39596. The equivalence test for observed equal to expected is χ^2 282.30518. The soundness and equivalence tests are essentially the same, but the WNP by KCN is significantly different.

[1] This is taken from the published hourly weather values of December, 2011 for Toronto International Airport named "London" as available from the Canadian Government weather archives. The temperature is in degrees centigrade which is a courser measure than degrees Fahrenheit, and wind speed is in km/hour which is a finer measure than miles/hour.