A Bayesian Network for Thunderstorm Weather Forecasting

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The Bureau of Meteorology issues cell based public warnings for severe thunderstorms that are forecast to affect major Australian capital cities. These warnings rely heavily on the detection of thunderstorm cells by weather watch radars. Forecasters work with automated algorithms that detect and track the most dangerous cells by analysing real time radar data and comparing the properties of cells detected with the details of the atmospheric environment in which the cells have formed.

A Bayesian decision network has been developed which uses the relationship between the properties of the cells and the characteristics of the environment to classify cells into more or less dangerous types, and to correct tracking errors seen in the automated tracking algorithms. The network has been tested on one day of data gathered from Sydney, which covered several hundred cell detections. On this limited test data set, the BN showed reduced storm tracking errors when compared with other automated techniques. The BN and manual severe storm warnings showed similar probability of detection, but the BN generally had a much lower false alarm rate.