

Neural network models to detect airplane near-collision situations

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Abstract— The US Federal Aviation Administration (FAA) has been investigating early warning accident prevention systems in an effort to prevent runway collisions. One system in place is the Airport Movement Area Safety System (AMASS), developed under contract for the FAA. AMASS internal logic is based on computing separation distances among airplanes, and it utilizes prediction models to foresee potential accidents. Research described in this paper shows that neural network models have the capability to accurately predict future separation distances and aircraft positions. Accurate prediction algorithms integrated in safety systems such as AMASS can potentially deliver earlier warnings to air traffic controllers, hence reducing the risk of runway accidents even further. Additionally, more accurate predictions will lower the incidence of false alarms, increasing confidence in the detection system. In this paper, different incipient detection approaches are presented, and several prediction techniques are evaluated using data from one large and busy airport. The main conclusion is that no single approach is good for every possible scenario, but the optimal performance is attained by a combination of the techniques presented.

Index Terms— Airport traffic management; collision avoidance; prediction models; neural networks

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