

Data fusion and uncertainty quantification for aerial drone autonomous navigation by Tsallis' statistics

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Aerial drone is a technology with many applications nowadays. Autonomous navigation is one relevant research topic, and a key issue is to estimate the drone position. Here, the signal from a Global Navigation Satellite System (GNSS) is not used to estimate the drone's position. Two approaches are combined to determine the drone positioning: a computer vision system (edge extraction in images by self-configuring supervised neural networks and correlation with georeferenced images), and a signal from an inertial sensor. The cited techniques are employed by a data fusion process by using a new formulation for the particle filter. The particle filter is a Bayesian method, and the Tsallis distribution is the likelihood operator. The filtering process is also able to address the uncertainty quantification associated with the drone trajectory estimation. The methodology was successful in performing the data fusion, generating good results, and allowing to compute the confidence interval.