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USING DEEP LEARNING FOR SPACE OBJECT POSE DETECTION

**Abstract**

We present an approach that employs deep learning techniques to detection the pose of resident space objects (RSO). Our algorithm focuses mainly on photometric data obtained from optical sensors and analysis of the computer simulation. Aiming at visible RSO, two different identification models are mainly trained by recurrent neural network (RNN) technique and convolutional neural network (CNN) technique to determine the pose of RSO. Firstly, the basic 3D shape model of the space object is established. Then, the BRDF model is processed to obtain the photometric time series signals of different basic shape model and different orientation of objects and the photometric data will be used as training samples. Next, RNN and CNN are trained with the feature sets of the training samples as input. Finally, new photometric timing signals obtained by optical sensors and analysis of the computer simulation are used as input to networks to identify the object pose. The initial results show that the pose of RSO can be detected effectively and accurately with the proposed approach, and by comparison, RNN is more computationally efficient than CNN for spatial object pose detection using photometric time series.