

A first look at the ECSS Machine Learning Handbook

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Given the increasing relevance and usage of machine learning in the space domain, there is a clear need for guidance regarding the creation of reliable and safe AI software, including the topic of verification and validation. The existing ECSS SW standards cannot easily be applied to machine learning solutions and the question of how to consider the specifics of AI development practices, is still not common knowledge. To cover this gap, the ECSS formed a working group to jointly collect and refine best practices related to the qualification of machine learning for software, tailored to the needs of the space domain, and focusing on the criticality categories B, C or D. The guidelines start with the recommendation to consider the business case for the given application as starting point and then proceed to advise on the data preparation and evaluation, on model training, testing, deployment, and operation, and lastly an evaluation the AI functions as part of the system engineering approach to space systems. This includes guidelines on how the data can be selected and qualified, how the training and evaluation of the ML models can be performed, and how a “safety cage architecture” can be applied, and discussion on how further mission specific qualification process can be implemented. The various steps are framed by information on relevant quality criteria, e.g., for the different types of ml-models, or providing recommendations on failure-mode analysis for systems using AI.

In this talk we would like to present the current status of the guidelines, which are under public review. Given the expertise of the audience a discussion on PA aspects related to ML applications might lead to useful feedback for improving the guidelines.