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Author: Mr. Patrick Fleith
Solenix GmbH, Germany, patrick.fleith@solenix.ch

ASTROSQUAD: BUILDING BLOCKS FOR THE DEVELOPMENT OF AN ASTRONAUTICS & SPACE QUESTION-ANSWERING DATASET TO BENCHMARK MACHINE COMPREHENSION OF TEXT

Abstract

A significant fraction of the time of Space-industry professionals is spent in processing technical documentation: finding a relevant document, getting the key engineering data needed for an analysis, or searching for lessons learnt from past missions. The recent breakthroughs in natural language processing opens the doors to deep learning-based information retrieval engines and conversational chatbots systems to alleviate and support the daily work of engineers. However, most state-of-the-art deep learning models require a lot of data to be trained, thus justifying the need for space-domain datasets. The paper presents the roadmap and the development status of the Astronautics and Space domain-specific Question Answering Dataset (AstroSQuAD) and discusses the requirements for AstroSQuAD to become a public benchmark for the training and validation of virtual digital assistants (e.g. question-answering systems) in the space industry. The dataset consists of questions posed by subject-matter experts on a variety of space engineering documents, and the acceptable answers expected from a reliable machine comprehension system. We present the types of questions (factoid, confirmation, unanswerable, etc.), and the variety of documents (design doc, textbook, procedure, test report, non-conformance report, academic paper, etc.) to be covered, along with the associated challenges. In addition, we elaborate on the methods to ensure quality control and data consistency throughout the whole labeling pipeline. Finally, examples of question-answer pairs are analyzed to understand the type of reasoning required to answer each category of question.