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Sample Alignment in Neutron Beamlines Using Reinforcement Learning

RadiaSoft has been developing machine learning (ML) methods for automating processes within the accelerator landscape for the past five years. One critical area of this work has been the full automation of sample alignment at neutron and x-ray beamlines to ensure both high quality experimental data and efficient use of operator hours. Historically, sample alignment has been a manual or a semi-automated process requiring significant levels of human intervention (particularly for time-intensive processes such as temperature scans). Due to the need for both visual and detector-based alignment of samples and the execution of corresponding beamline controls, ML methods, and reinforcement learning (RL) in particular, are well-suited for this application. Here we provide an overview of both the visual and detector-based aspects of the sample alignment problem and describe our plans and early results for applying RL to the controls portion of sample alignment for neutron beams. We will also discuss how our current work will be extended to x-ray beamlines.

Possible contributed talk

Yes

Are you a student?

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