

Variational Autoencoders for Noise Reduction in Industrial LLRF Systems

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Industrial particle accelerators inherently operate in much dirtier environments than typical research accelerators. This leads to an increase in noise both in the RF system and in other electronic systems. Combined with the fact that industrial accelerators are mass produced, there is less attention given to optimizing the performance of an individual system. As a result, industrial systems tend to under perform considering their hardware capabilities. With the growing demand for accelerators for medical sterilization, food irradiation, cancer treatment, and imaging, improving the signal processing of these machines will increase the margin for the deployment of these systems. Our work is focusing on using machine learning techniques to reduce the noise of RF signals used for pulse-to-pulse feedback in industrial accelerators. We will review our algorithms, simulation results, and results working with measured data. We will then discuss next steps for deployment and testing on an industrial system.

Keyword

Machine Learning, Noise Reduction, Industrial Accelerators

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