Problem Statement:

Quantum Computing promises to solve problems that are currently not solvable by classical algorithms by the means of quantum mechanical phenomenon’s and quantum nature of the information. The current quantum machines available for use and research fall under the concept of NISQ (Noisy Intermediate-scale quantum). Exploiting the nature of quantum in NISQ era to solve practically relevant problems is the emerging research area.

On the other hand, Machine Learning promises to leverage classical computation to solve ever more complicated problems. More research has been made in the field of deep neural networks (deep learning) and big data. There are some algorithms that outperforms the deep learning algorithms. One of those is Kernel Methods, they are considered the corner stone of classical machine learning.

Now the amalgamation of these to technologies is the more interesting and currently researched on larger scale. Quantum Machine Learning has gained more traction lately. The most prominent approach that is being used in QML is Parameterized Quantum Circuit (PQC’s) [cited papers: Supervised learning with Qunatum Computers, Quantum, Machine Learning: What Quantum Computation means to data mining, Effect of data Encoding on the expressive power of variational quantum machine learning models]. Specifically kernel methods and combination of Kernel methods and parameterized quantum kernels (QEK : Quantum Embedded Kernels) have emerged [cited papers: Supervised Learning with Quantum Enhanced Feature Space, Quantum Machine learning in feature Hilbert space, Experimental Quantum Kernel Machine Learning with nuclear spins, Experimental quantum kernel machine learning in finite feature space, Quantum Classifier with tal]