# Performance Benchmarks for Qiskit Machine Learning - Final Showcase

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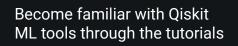
# Background



- → Qiskit Machine Learning was lacking in performance benchmarks
- → Performance benchmarks measure the metrics such as memory consumption, time taken for execution and score of a ML model over the lifetime of a project
- → Important to track benchmarks to ensure functionality improves over time

# Journey





Build ML models for each benchmark and try all combinations of feature maps, ansatze and optimizers



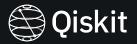
Identify what benchmarks needed to be added and create Python scripts Choose the the configuration of parameters that yielded a balance of best scores and shortest time taken to run

## Problems Encountered



- → Took too long to run benchmarks
- → Solution: cache the weights of the trained model

## What we achieved



#### Classification

- New iris dataset
- → Score benchmarks for VQC, TwoLayerQNN and CircuitQNN

#### Regression

- New Combined Cycle PowerPlant (CCPP) dataset
- VQR training and score benchmarks
- TwoLayerQNN training and score benchmarks

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circuit_qnn_classifier_score_benchmark					
CircuitQnnScoreClassifierBenchmarks.track_false_neg CircuitQnnScoreC	ClassifierBenchmarks.track_false_po	s CircuitQnnScoreClassiflerBen	chmarks.track_overall_ac	CircuitQnnScoreClassifierBenchmarks.track_true_neg	CircuitQnnScoreClassifierBenchmarks.track_true_posit
opflow_qnn_classifier_benchmark					
OpflowQnnClassifierBenchmarks.time_predict_opflow_ OpflowQnnClassi	fierBenchmarks.time_score_opflow_	q			
		opflow	ann cla	ssifier_fit_benchm	nark
OpflowQnnFitClassifierBenchmarks.time_fit_opflow_qn			_[]		
	vgc benchmark				
VqcBenchmarks.time_predict_vqc VqcBe	nchmarks.time_score_vqc		. 4-		
				E on House E	
	vqc_fit_benchmark				
VqcFitBenchmarks.time_fit_vqc					

#### Plans for the future



- → ML classification benchmarks PR review and merge #27
- → ML regression benchmarks PR review and merge #28
- Quantum kernel benchmarks

# Any Questions?



Thank you Anton for being a great mentor!

and thank you to Qiskit for this amazing opportunity