Extended Pattern Coverage Analysis

This report analyzes the coverage of 61 extended patterns across: - Three sourcing frameworks (Classiq, PennyLane, Qiskit) - Broader target list of projects

Summary Statistics

Framework Coverage

Framework	Patterns Found	Coverage %
Classiq	17	27.9%
PennyLane	20	32.8%
Qiskit	13	21.3%

Target Project Coverage

Patterns found in target projects: 21 (34.4%)

Detailed Framework Analysis

Classiq

Found: 17 patterns

Patterns found: - Amplitude Amplification - Basis Change - Circuit Construction Utility - Creating Entanglement - Data Encoding - Dynamic Circuit - Function Table - Grover - Hamiltonian Simulation - Initialization - Oracle - Phase Shift - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Phase Estimation (QPE) - SWAP Test - Variational Quantum Algorithm (VQA)

Missing patterns (44): - Ad-hoc Hybrid Code Execution - Alternating Operator Ansatz (AOA) - Biased Initial State - Chained Optimization - Circuit Cutting - Classical-Quantum Interface - Error Correction - Gate Cut - Gate Error Mitigation - Hadamard Test - Hybrid Module - Linear Combination of Unitaries (LCU) - Mid-Circuit Measurement - Orchestrated Execution - Post-Selective Measurement - Pre-Trained Feature Extractor - Pre-deployed Execution - Prioritized Execution - Quantum Amplitude Estimation (QAE) - Quantum Application Archive - Quantum Application Testing - Quantum Associative Memory (QuAM) - Quantum Circuit Translator - Quantum Classification - Quantum Clustering - Quantum Hardware Selection - Quantum Kernel Estimator (QKE) - Quantum Logical Operators - Quantum Module - Quantum Module Template - Quantum Neural Network (QNN) - Quantum Singular Value Transformation (QSVT) - Quantum-Classic Split - Readout Error Mitigation - Schmidt Decomposition - Speedup via Verifying - Standalone Circuit Execution - Uncompute - Unified Execution - Unified Observability - Variational Parameter Transfer - Variational Quantum Eigensolver (VQE) - Warm Start - Wire Cut

PennyLane

Found: 20 patterns

Patterns found: - Amplitude Amplification - Basis Change - Circuit Construction Utility - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Linear Combination of Unitaries (LCU) - Oracle - Phase Shift - Quantum Amplitude Estimation (QAE) - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Neural Network (QNN) - Quantum Phase Estimation (QPE) - Quantum Singular Value Transformation (QSVT) - SWAP Test - Schmidt Decomposition - Variational Quantum Algorithm (VQA) - Variational Quantum Eigensolver (VQE)

Missing patterns (41): - Ad-hoc Hybrid Code Execution - Alternating Operator Ansatz (AOA) - Biased Initial State - Chained Optimization - Circuit Cutting - Classical-Quantum Interface - Creating Entanglement - Dynamic Circuit - Error Correction - Function Table - Gate Cut - Gate Error Mitigation - Hadamard Test - Hybrid Module - Mid-Circuit Measurement - Orchestrated Execution - Post-Selective Measurement - Pre-Trained Feature Extractor - Pre-deployed Execution - Prioritized Execution - Quantum Application Archive - Quantum Application Testing - Quantum Associative Memory (QuAM) - Quantum Circuit Translator - Quantum

Classification - Quantum Clustering - Quantum Hardware Selection - Quantum Kernel Estimator (QKE) - Quantum Logical Operators - Quantum Module - Quantum Module Template - Quantum-Classic Split - Readout Error Mitigation - Speedup via Verifying - Standalone Circuit Execution - Uncompute - Unified Execution - Unified Observability - Variational Parameter Transfer - Warm Start - Wire Cut

Qiskit

Found: 13 patterns

Patterns found: - Basis Change - Circuit Construction Utility - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Oracle - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Logical Operators - Quantum Phase Estimation (QPE) - Variational Quantum Algorithm (VQA) - Variational Quantum Eigensolver (VQE)

Missing patterns (48): - Ad-hoc Hybrid Code Execution - Alternating Operator Ansatz (AOA) - Amplitude Amplification - Biased Initial State - Chained Optimization - Circuit Cutting - Classical-Quantum Interface - Creating Entanglement - Dynamic Circuit - Error Correction - Function Table - Gate Cut - Gate Error Mitigation - Hadamard Test - Hybrid Module - Linear Combination of Unitaries (LCU) - Mid-Circuit Measurement - Orchestrated Execution - Phase Shift - Post-Selective Measurement - Pre-Trained Feature Extractor - Pre-deployed Execution - Prioritized Execution - Quantum Amplitude Estimation (QAE) - Quantum Application Archive - Quantum Application Testing - Quantum Associative Memory (QuAM) - Quantum Circuit Translator - Quantum Classification - Quantum Clustering - Quantum Hardware Selection - Quantum Kernel Estimator (QKE) - Quantum Module - Quantum Module Template - Quantum Neural Network (QNN) - Quantum Singular Value Transformation (QSVT) - Quantum-Classic Split - Readout Error Mitigation - SWAP Test - Schmidt Decomposition - Speedup via Verifying - Standalone Circuit Execution - Uncompute - Unified Execution - Unified Observability - Variational Parameter Transfer - Warm Start - Wire Cut

Target Project Analysis

Patterns found in target projects: 21

Patterns found: - Amplitude Amplification - Basis Change - Circuit Construction Utility - Creating Entanglement - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Linear Combination of Unitaries (LCU) - Oracle - Phase Shift - Quantum Amplitude Estimation (QAE) - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Logical Operators - Quantum Neural Network (QNN) - Quantum Phase Estimation (QPE) - Quantum Singular Value Transformation (QSVT) - SWAP Test - Variational Quantum Algorithm (VQA) - Variational Quantum Eigensolver (VQE)

Missing patterns (40): - Ad-hoc Hybrid Code Execution - Alternating Operator Ansatz (AOA) - Biased Initial State - Chained Optimization - Circuit Cutting - Classical-Quantum Interface - Dynamic Circuit - Error Correction - Function Table - Gate Cut - Gate Error Mitigation - Hadamard Test - Hybrid Module - Mid-Circuit Measurement - Orchestrated Execution - Post-Selective Measurement - Pre-Trained Feature Extractor - Pre-deployed Execution - Prioritized Execution - Quantum Application Archive - Quantum Application Testing - Quantum Associative Memory (QuAM) - Quantum Circuit Translator - Quantum Classification - Quantum Clustering - Quantum Hardware Selection - Quantum Kernel Estimator (QKE) - Quantum Module - Quantum Module Template - Quantum-Classic Split - Readout Error Mitigation - Schmidt Decomposition - Speedup via Verifying - Standalone Circuit Execution - Uncompute - Unified Execution - Unified Observability - Variational Parameter Transfer - Warm Start - Wire Cut

Patterns Found Only in Frameworks (Not in Target Projects)

3 patterns found in frameworks but not in target projects: - Dynamic Circuit - Function Table - Schmidt Decomposition

Cross-Framework Analysis

Common patterns between Classiq and PennyLane (14): - Amplitude Amplification - Basis Change - Circuit Construction Utility - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Oracle - Phase Shift - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Phase Estimation (QPE) - SWAP Test - Variational Quantum Algorithm (VQA)

Common patterns between Classiq and Qiskit (11): - Basis Change - Circuit Construction Utility - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Oracle - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Phase Estimation (QPE) - Variational Quantum Algorithm (VQA)

Common patterns between PennyLane and Qiskit (12): - Basis Change - Circuit Construction Utility - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Oracle - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Phase Estimation (QPE) - Variational Quantum Algorithm (VQA) - Variational Quantum Eigensolver (VQE)

Patterns found in all three frameworks (11): - Basis Change - Circuit Construction Utility - Data Encoding - Grover - Hamiltonian Simulation - Initialization - Oracle - Quantum Approximate Optimization Algorithm (QAOA) - Quantum Arithmetic - Quantum Phase Estimation (QPE) - Variational Quantum Algorithm (VQA)