TEAM QUANSA

QUANTUM CONSPICUITY DETECTION PROJECT

A WOMANIUM QUANTUM AND AI PROJECT

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04

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01: OBJECTIVES

Familiarized ourselves with Pennylane & JAX, Variational Classifier and Quanvolutional Neural Networks

PHASE 1

Developed our own model and use it to learn the sine function on the interval [0, 2π].

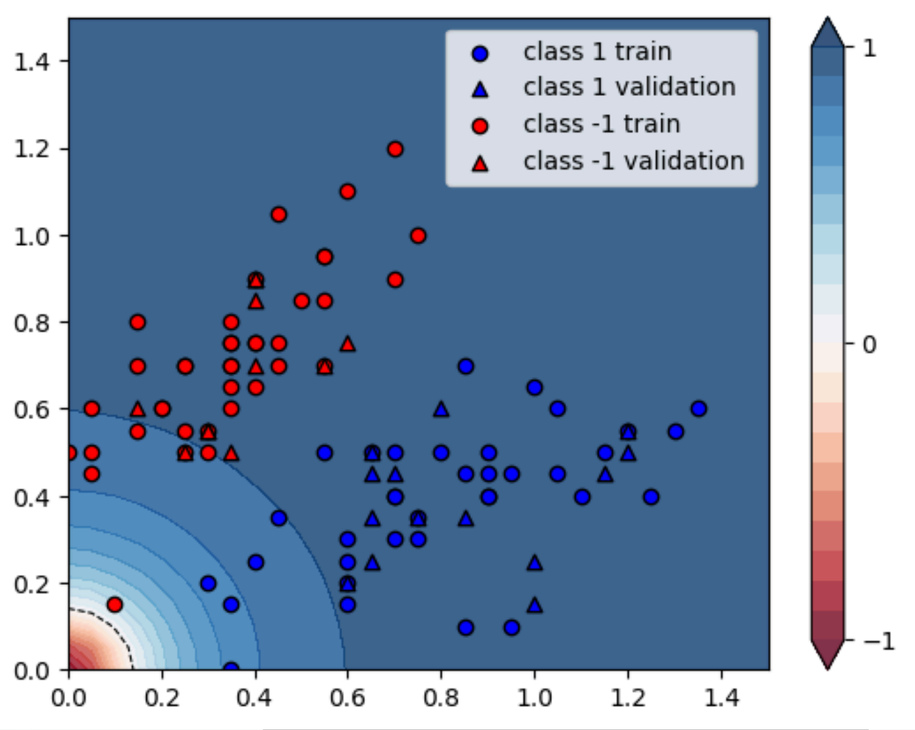
PHASE 2

Changed the data set from the sine function to a real-word data-set from the industry.

PHASE 3

02: PROJECT SOLUTION

PHASE 1: Implemented various approaches towards solving the tasks at hand, such as using different datasets (i.e. Quanvolutional Neural Networks Task)

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Iteration 86, Cost: 1.4799999999999998
Iteration 87, Cost: 1.4799999999999998
Iteration 88, Cost: 1.4799999999999998
Iteration 89, Cost: 1.4799999999999998
Iteration 90, Cost: 1.4799999999999998
Iteration 91, Cost: 1.4799999999999998
Iteration 92, Cost: 1.4799999999999998
Iteration 93, Cost: 1.4799999999999998
Iteration 94, Cost: 1.4799999999999998
Iteration 95, Cost: 1.4799999999999998
Iteration 96, Cost: 1.4799999999999998
Iteration 97, Cost: 1.4799999999999998
Iteration 98, Cost: 1.4799999999999998
Iteration 99, Cost: 1.4799999999999998
Iteration 100, Cost: 1.4799999999999998
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PHASE 2: Parameterized RY gate followed by an expval of Pauli-Z on the qubit as well as calculated the squared difference between the circuit output and the target output

02: PROJECT SOLUTION (CONT'D)

PHASE 3: Our model encompasses key elements such as:

- Feature engineering (in this case PCA)
- Different, and in certain cases, more complex ansatz with more layers and gates

85%

★★★★★★★★★★

MODEL PREDICTED ACCURACY

03: SUCCESS

The model is trained using the training data (X_train, Y_train), and it learns to make predictions based on the input features.

METRIC N°1: ACCURACY

The trained model is used to predict the labels for the test data (X_test), resulting in Y_pred. It measures how many selected items are relevant.

METRIC N°2: PREDICTION

The recall_score function compares the true labels (Y_test) with the predicted labels (Y_pred) to calculate the recall. It shows how many true positive instances were correctly predicted

METRIC N°3: RECALL

04: FUTURE SCOPE

FUTURE PROSPECTS: The Womanium Quantum + AI program has been a game changer in how we plan on approaching the Quantum + AI field. Our interest and passion in Quantum + AI does not end here and we are more than excited to keep pushing forward (maybe also possibly with this great and in-depth Fraunhofer project)

LIMITATIONS: We are quite new to the realm of Quantum, hence we each individually spent much more time learning the foundations, which made us manage our time inefficiently. However, the foundational learnings made the experience all the more interesting

THANK YOU

This Presentation is Proudly Brought to You By: Jessica Omuna Anabor and Betul Gul

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