CPEN 400Q Lecture 07
Hands-on with the variational quantum classifier (VQC)

Monday 29 January 2024

Announcements

- Quiz 3 today
- Extra office hour: Wednesday 1:00-2:00 KAIS 3043
- Midterm on Wednesday
  - Closed book, no calculator; see formula sheet on Piazza
  - Pen-and-paper problems only; no programming
  - Covers lectures 01-07, including concepts from today
  - Bring your UBC ID card

Last time

We computed expectation values of observables by hand.

$$\langle B \rangle = \langle \psi | \, B | \psi \rangle$$

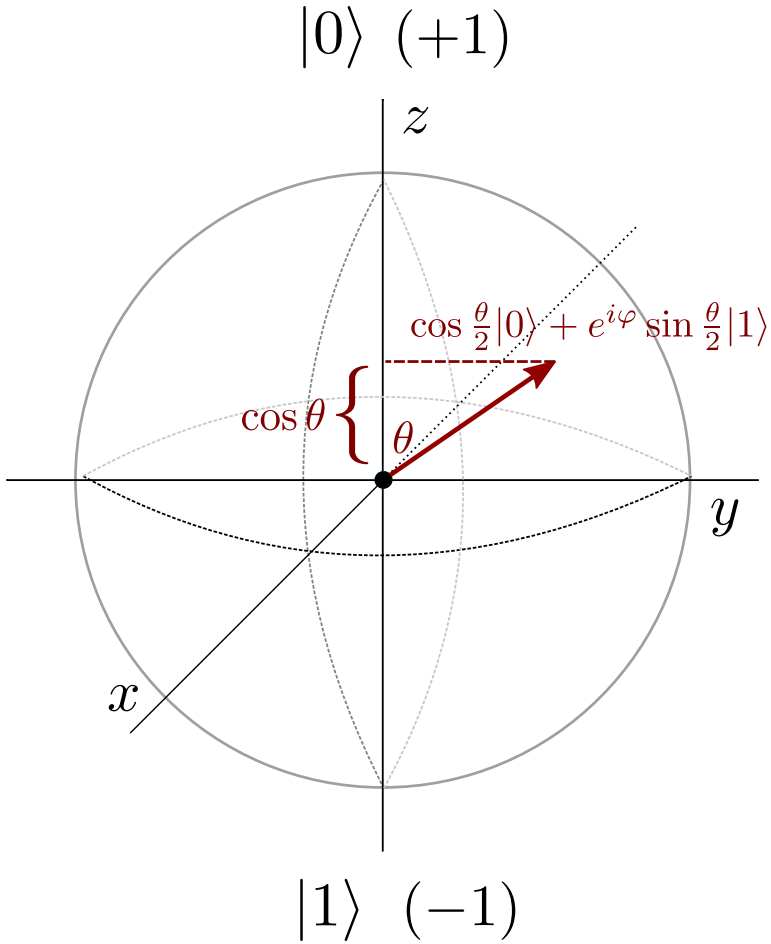
We computed expectation values of observables in PennyLane.

```
dev = qml.device('default.qubit', wires=1)

@qml.qnode(dev)
def measure_z():
    qml.RX(2*np.pi/3, wires=0)
    return qml.expval(qml.PauliZ(0))
```

Last time

We measured expectation values of observables, and related them to projective measurements / the Bloch sphere for a single qubit.



Today

Hands-on activity, download from PrairieLearn:

- describe the structure of variational quantum algorithms
- design and implement a parametrized circuit using elementary gates
- express the cost function of an optimization problem in terms of a quantum measurement
- use a quantum circuit as a simple classifier

Next time

Content:

- Midterm

Action items:

1. Assignment 1 (can do all problems now)
2. Finish and submit hands-on