Title: Quantum Machine Learning Algorithm Online Labs using HTML5 and Mobile platforms Future Work

Glen Uehara, and Andreas Spanias

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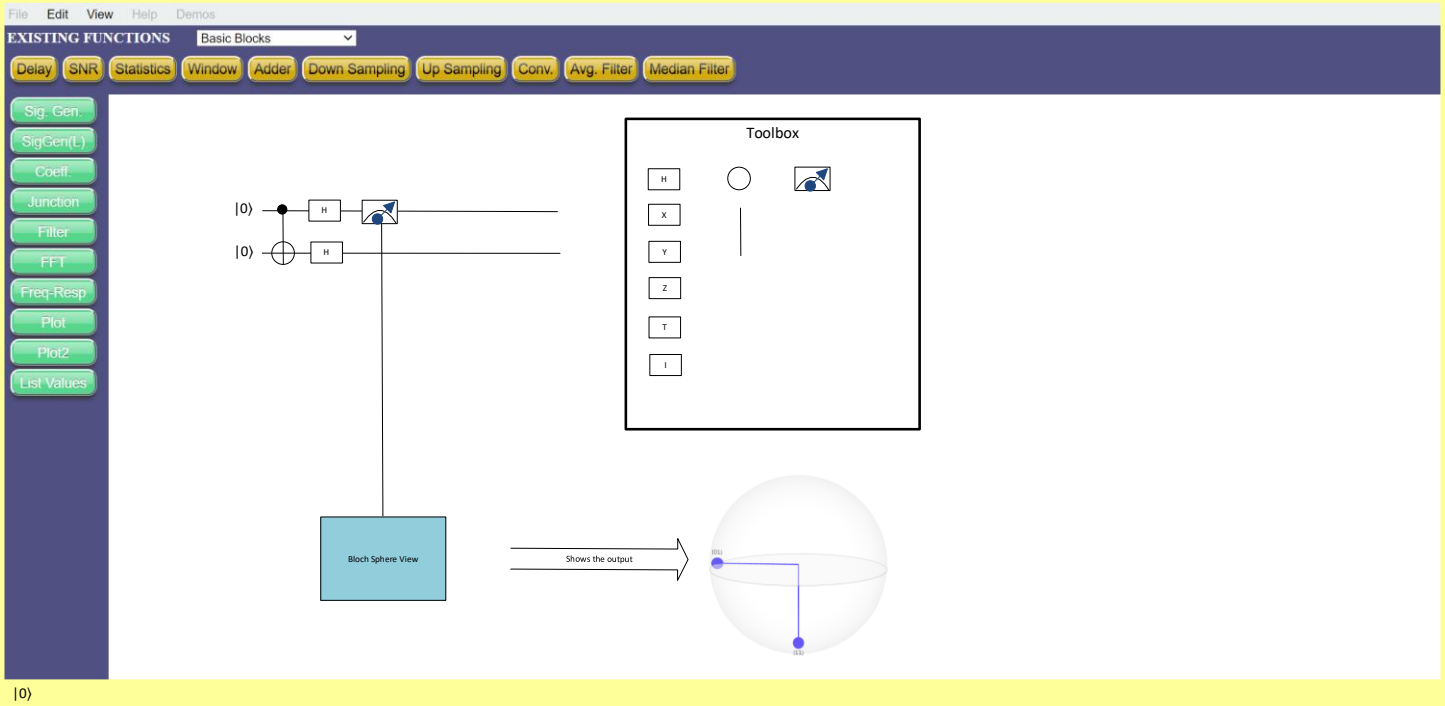
Motivation

- **Understand new Quantum Algorithm development.**
- **Requirements for online education.**
- **Ability to utilize single development tool to build classical and quantum systems**
  - **Allows students to switch and verify between the two**
- **Build basic understanding of Quantum Mechanics for algorithm development**
  - **Qubits, quantum circuits, Bloch sphere, linear algebra (quantum)**

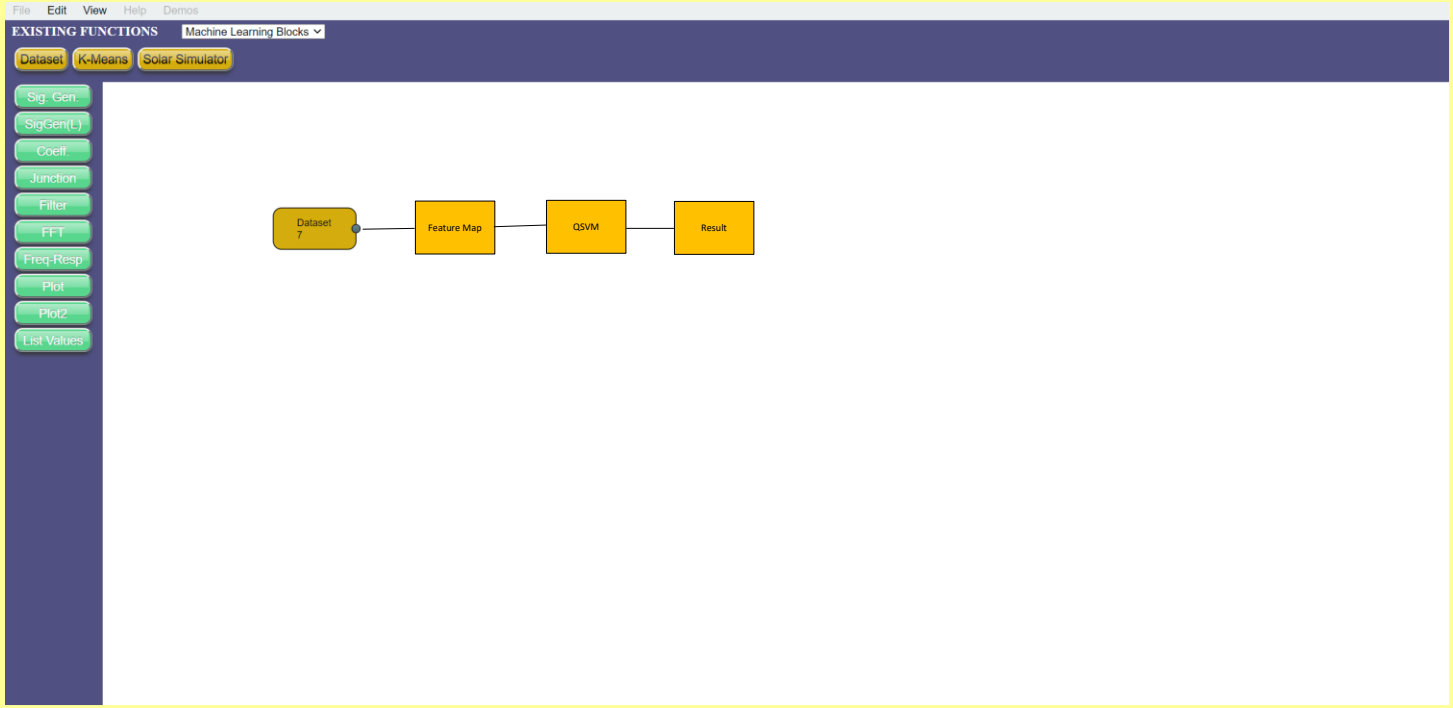
Quantum Circuit Design J-DSP

- **New method to develop quantum circuit**
- **Fundamentals for Quantum Algorithm development**
  - **Used to understand qubits, quantum gates and Bloch Sphere**
- **Ability to save new circuit to a module**



Quantum Machine Learning Development

- **Students can quickly test existing quantum machine learning modules or develop new ones using quantum circuit design**
- **Easily test the system**
- **Add classical python module to create hybrid quantum-classical system (future)**



Quantum Development Engine

- **Using open-source quantum development SDK base on python**
  - **Currently based on IBM Qiskit**
- **Allows integration into free Quantum Compute system from IBM or IonQ (ad-version 2021)**
- **Visual development of algorithm vs python code**
  - **Allows for faster validation of quantum circuits**
- **Any new open-source python package can be developed into a toolbox for integration into J-DSP**

PLANNED ASSESSMENT

- **J-DSP assessment will be made through online forms and feedback from the students using the software in courses.**
- **The online exercises and labs performed on J-DSP software will automatically store qualitative as well as quantitative data over the network.**
- **Feedback forms students are collected in form of general assessment.**
- **The users fill out and submit such forms instantaneously. The feedback data can also be accessed by links provided on-line.**

CONCLUSION

- **The new software allows users to interact with new quantum algorithm techniques**
- **This gives them new opportunities to interact with various quantum hardware or local simulator for quantum machine learning.**
- **Interfacing with remote devices makes it a powerful tool in tracking the habits and daily activities of the user.**
- **Students will be exposed to Quantum Computing on a user-friendly platform**
- **We will disseminate in the DSP class and other UG classes**
- **We will perform assessment.**

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