Google Summer of Code 2021: qutip-tensorflow

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A little bit of background

QuTiP 5 will come with a new dispatching system that includes by two data layers:

- `Dense` matrices for small or dense `qobj`.
- `CSR` matrices for large or sparse `qobj`.

qutip-tensorflow

A plug-in for QuTiP providing a TensorFlow linear-algebra backend.

- We can now operate in a GPU using QuTiP.
- QuTiP now benefits from TensorFlow's auto differentiation and optimization features.

Operating with a GPU.

Example with a gtx 970. At the loss of considerable accuracy, complex64 achives noticeable higher operation speeds.

Hardware:

- GPU: gtx 970
- CPU: intel i7-6700

Benchmark

Small set of benchmarks can be run locally.

Useful to asses if speedups can be achieved.

Auto differentiation and minimization.

Auto differentiation is supported using TensorFlow's `GradientTape`. This allows us

See more involved example of autodifferentiation in `qutip_tensorflow/examples`.

Mentors

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Thank you for your time!