

Humans Need Not Apply

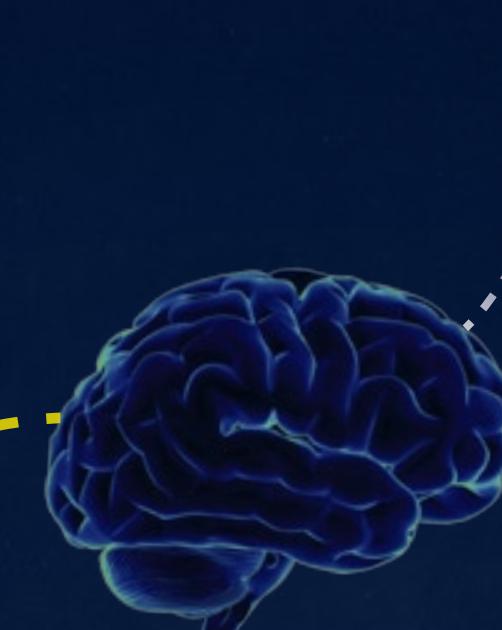
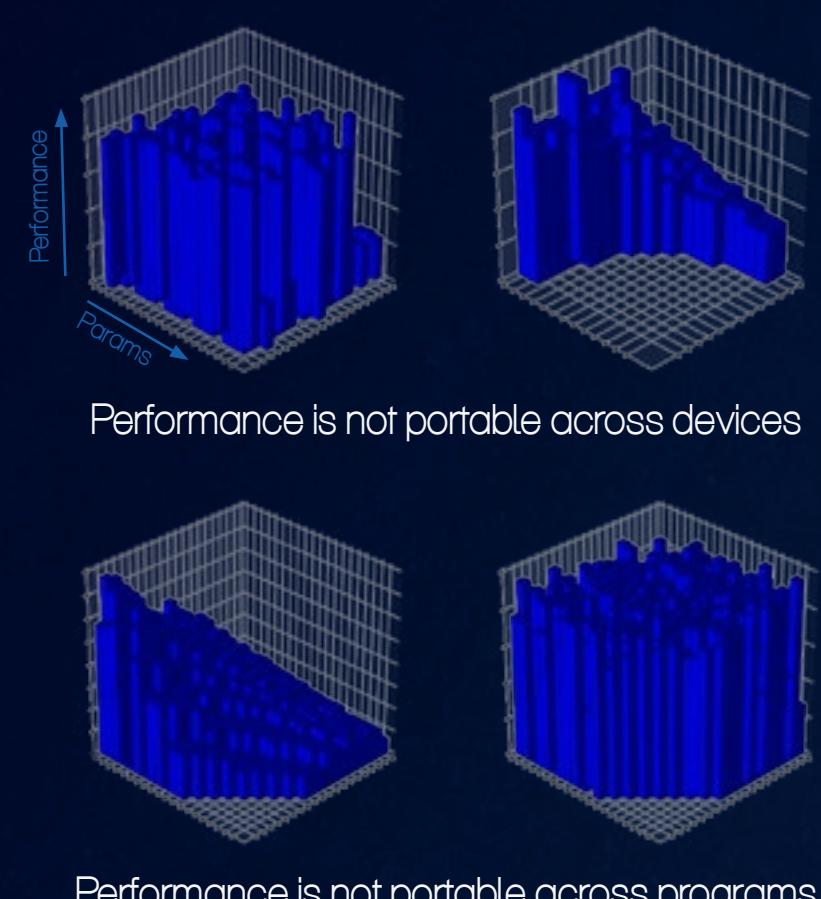
Self-tuning programs are here, and they outperform human experts

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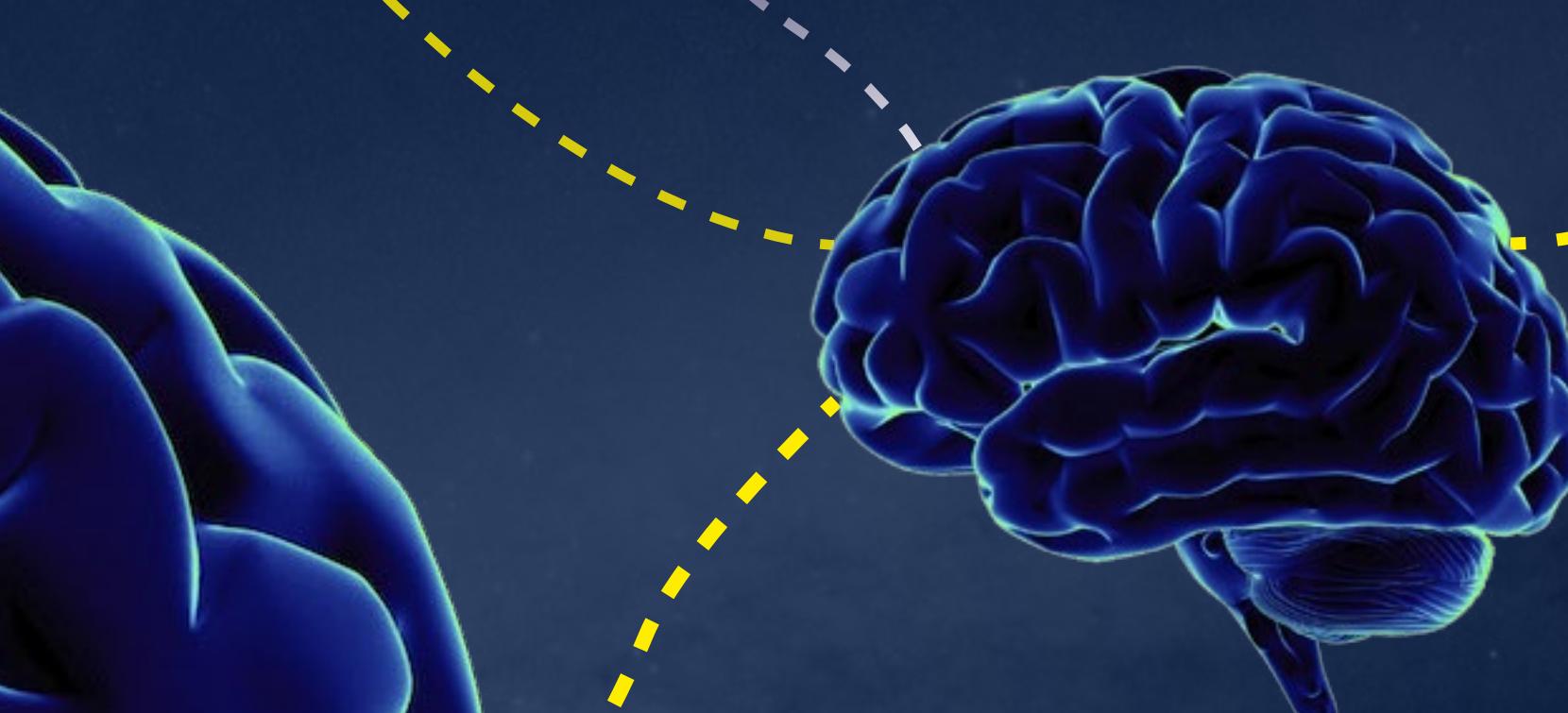
5.0X
speedup!

Predicting OpenCL workgroup sizes
of 429 stencil programs, execution
devices, and datasets.

**Hand tuning programs
is expensive and time
consuming**



```
// Create input and populate with random values
stencilData_t DATA_T;
stencilData_t DATA_I;
padding_t padding;
int height, width, deviceType;
// Create stencil
stencilData_t DATA_T;
stencilData_t DATA_I;
padding_t padding;
int height, width, deviceType;
```



We **automate** this task
using collaborative
machine learning

```
// Create input and output data.
typedef float DATA_T;
// "Complex" kernel: Performs lots of trigonometric heavy lifting.
DATA_T sum = 0;
for (int i = 0; i < height * width; i++) {
    for (int j = 0; j < height * width; j++) {
        if (i == j) continue;
        DATA_T x = matrix[i][j].real();
        DATA_T y = matrix[i][j].imag();
        DATA_T z = matrix[j][i].real();
        DATA_T w = matrix[j][i].imag();
        sum += getReal(z * cos(x) - y * sin(x));
        sum += getImag(z * sin(x) + y * cos(x));
    }
}
matrix[0][0] = sum;
```



Introducing OmniTune ...



OmniTune generates synthetic benchmark
programs to use for empirical testing



OmniTune collaboratively gathers performance
data by testing different parameter values



OmniTune uses machine learning to predict
parameters for unseen programs at runtime

Read more ...

