MAP-Elites (Multi-dimensional Archive of Phenotypic Elites [1]) is a quality diversity algorithm, meaning that it collects a diverse archive of quality solutions to a problem. We used MAP-Elites to evolve flying machines in Minecraft [2]. These structures are collections of blocks that move perpetually in one direction forever using pistons and other components. The quality diversity approach was more effective than evolutionary computation using fitness alone.

### Binning Schemes
- How the archive of the most fit shapes is organized
- Count: 1D: refers to the number of blocks in the specified shape
- Count/Negative Space: 2D: number of blocks vs. the number of air blocks that are within the bounds the shape
- Piston Orientation: 3D: how many (sticky) pistons are facing in each orientation (North/South, Up/Down, and East/West).

### Experiment and Results
- Compared pure fitness to several binning schemes
- Flying machines were produced over half the time with MAP-Elites with all binning schemes, but this was not the case for the fitness based approach
- Fitness alone also had the least diversity in the number of directions the flying machines fly in
- The Piston Orientation binning scheme was the most successful in terms of number of successful runs and diversity of directions being flown in
- MAP-Elites was more successful than pure fitness