

- ▶ I will be in Zoom room and discuss your questions on usage of GPUs, the pre-lab 2 and help you with lab 3
- ▶ You do not have to stay in the Zoom room all the time
- ▶ I will try to notice you on Slack if we are going to discuss something of interest to many people
- ▶ Feel free to work on the lab outside the scheduled hours
- ▶ We have a reservation on Wednesday – Friday, as announced in the Slack channel
 - ▶ It will only work within the announced hours, do not use it outside the scheduled hours as your jobs will not run!

- ▶ Solved on a regular $n \times m$ grid of cells
- ▶ Each cell has 8 neighbors (including diagonals)
 - ▶ Each cell can take two values, 1/True or 0/False
 - ▶ Live cell: value 1
 - ▶ Dead cell: value 0
- ▶ Evolution from iteration $i - 1$ to iteration i defined by current state and neighbors
 - ▶ Any live cell with two or three neighbors survives
 - ▶ All other live cells die
 - ▶ Less than 2 neighbors: underpopulation
 - ▶ More than 3 neighbors: overpopulation
 - ▶ Any dead cell with exactly three live neighbors becomes a live cell
 - ▶ All other dead cells stay dead
- ▶ All rules are evaluated based on number of live or dead neighbors in previous iteration step $i - 1$

- ▶ Compute number of live neighbors to each cell on a fixed grid
 - ▶ Possibly with extra term for current cell alive/dead
- ▶ Apply rule based on live/dead status and number of live neighbors
- ▶ Represent operation as a convolution
 - ▶ Read up on syntax for convolution with TensorFlow
- ▶ Repeat for N generations

- ▶ Our algorithm is not an *efficient* way to solve problem
- ▶ Hashlife: Use fact that Game of Life is fully deterministic
 - ▶ If a certain patch is identical to some patch seen before, evolution of patch can be predicted
 - ▶ With some caveats of course
- ▶ We represent state as floating point numbers – could use narrower, more efficient format
- ▶ Data locality from one iteration to next?
- ▶ We will not look into this
- ▶ [https://en.wikipedia.org/wiki/Breeder_\(cellular_automaton\)](https://en.wikipedia.org/wiki/Breeder_(cellular_automaton))
- ▶ [https://en.wikipedia.org/wiki/Breeder_\(cellular_automaton\)#/media/File:Conways_game_of_life_breeder_animation.gif](https://en.wikipedia.org/wiki/Breeder_(cellular_automaton)#/media/File:Conways_game_of_life_breeder_animation.gif)