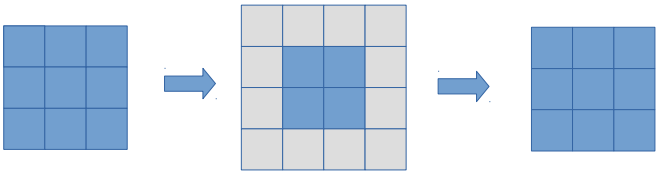
Odd-Boundary Conditions

by Sven Nilsen, 2019

Using Generalized Pascal's Triangle, there is a natural interpretation of boundary conditions on a closed grid, called "odd-boundary conditions".

Since the odd-layers contain cells that are centered between their parent cells, one can think about the odd-layer as a shrunken grid. Yet, the next even layer depends on the surrounding cells of the shrunken grid. By surrounding this shrunken grid with cells containing information about the boundary condition, one can think about Generalized Pascal's Triangle as having a natural interpretation of boundary conditions as encoded information in odd-layers.



Odd-boundary conditions are immutable. Their values do not depend on previous layers, yet they contribute to the values of future layers.

A conjecture is that when the normalized automaton of a Generalized Pascal's Triangle integrates to infinity over a closed grid, the initial information in the non-boundary vanishes compared to the information in the boundary, assuming that the boundary conditions are the same for every odd-layer.

This conjecture means that the odd-boundary conditions determine the long term behavior of the normalized automaton, while every non-zero initial condition produces converging results.

When the boundary condition is zero, it does not matter whether the automaton is normalized or not, because zero divided by a non-zero number is still zero. This is the only boundary condition that does not change the semantics of a normalized automaton compared to an unnormalized automaton.

With other words, assuming that normalization is unnatural and gives predictions that deviate from those in a Path Reference Class, there is only one odd-boundary condition we can choose: Zero.

A Path Reference Class using Generalized Pascal's Triangle will then converge to some solution when initialized with a non-zero value, or it will stay zero all the time. This greatly simplifies how to reason about the long-term behavior of odd-boundary conditions.

The question remains whether the choice of odd-boundary conditions in itself is natural.