Prisoners and Spatial Structure

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SWORDS, October 2016

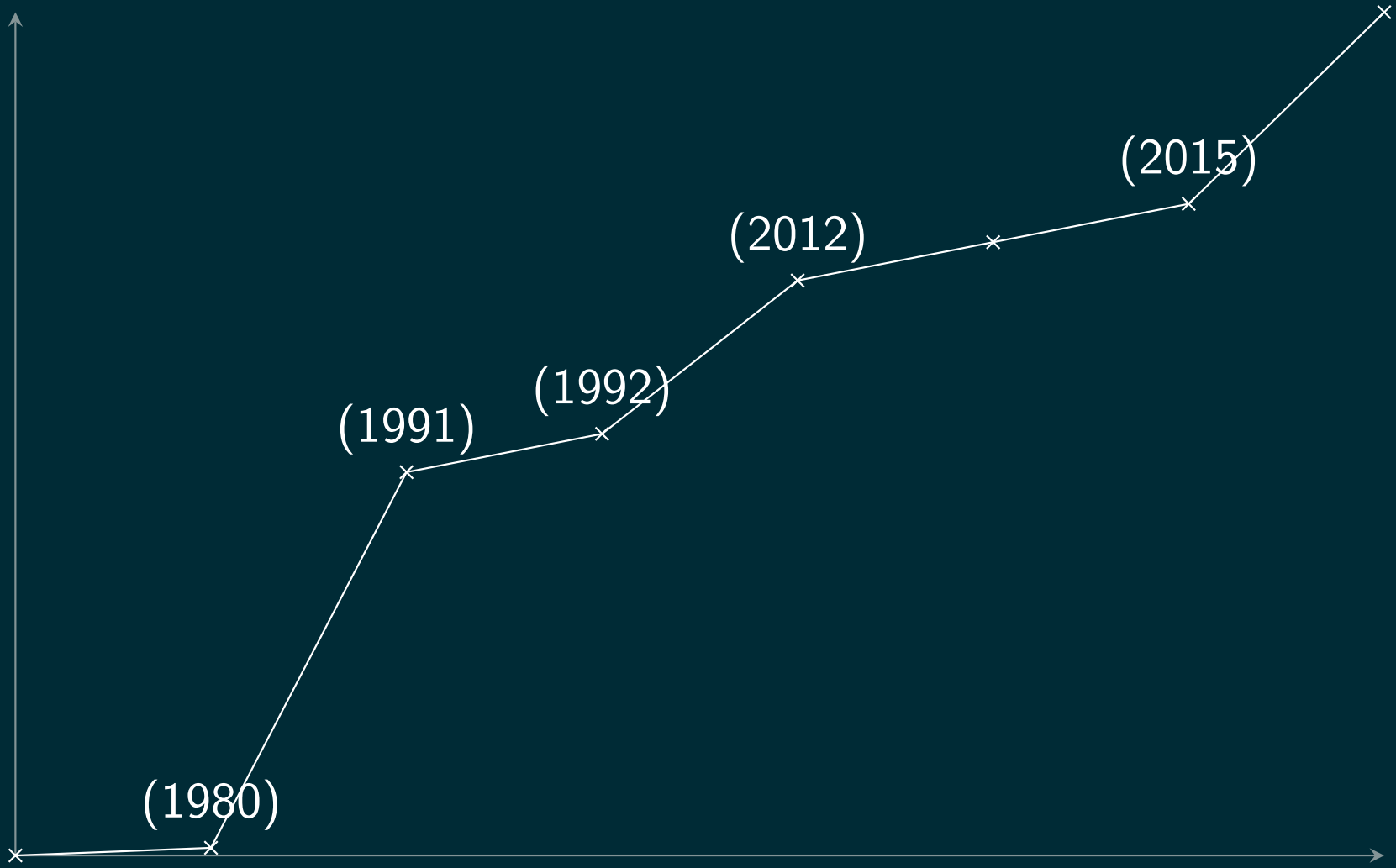
Prisoners and Spatial Structure

$$\begin{bmatrix} 3,3 & 0,5 \\ 5,0 & 1,1 \end{bmatrix}$$

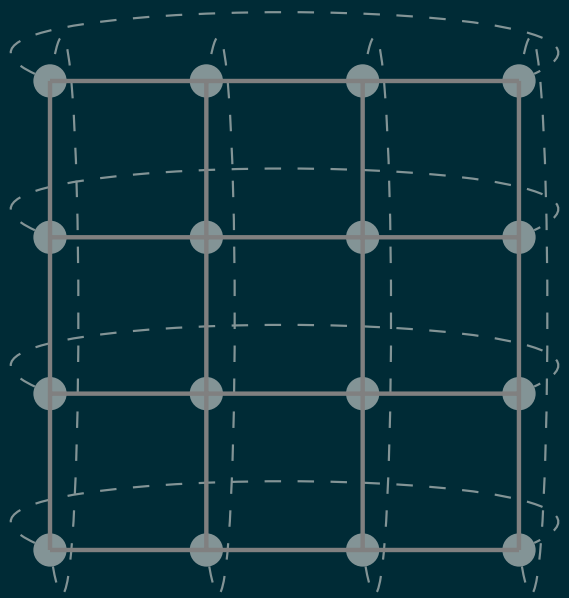
Strategy

```
class Grumpy(Player):
"""
A player that gets grumpier the more the opposition defects,
and nicer the more they cooperate.
Starts off Nice, but becomes grumpy once the grumpiness threshold is hit.
Won't become nice once that grumpy threshold is hit, but must reach a much
lower threshold before it becomes nice again.
"""
self.grumpiness = opponent.defections - opponent.cooperations
if self.state == 'Nice':
    if self.grumpiness > self.grumpy_threshold:
        self.state = 'Grumpy'
        return D
    return C
if self.state == 'Grumpy':
    if self.grumpiness < self.nice_threshold:
        self.state = 'Nice'
        return C
     return D
```

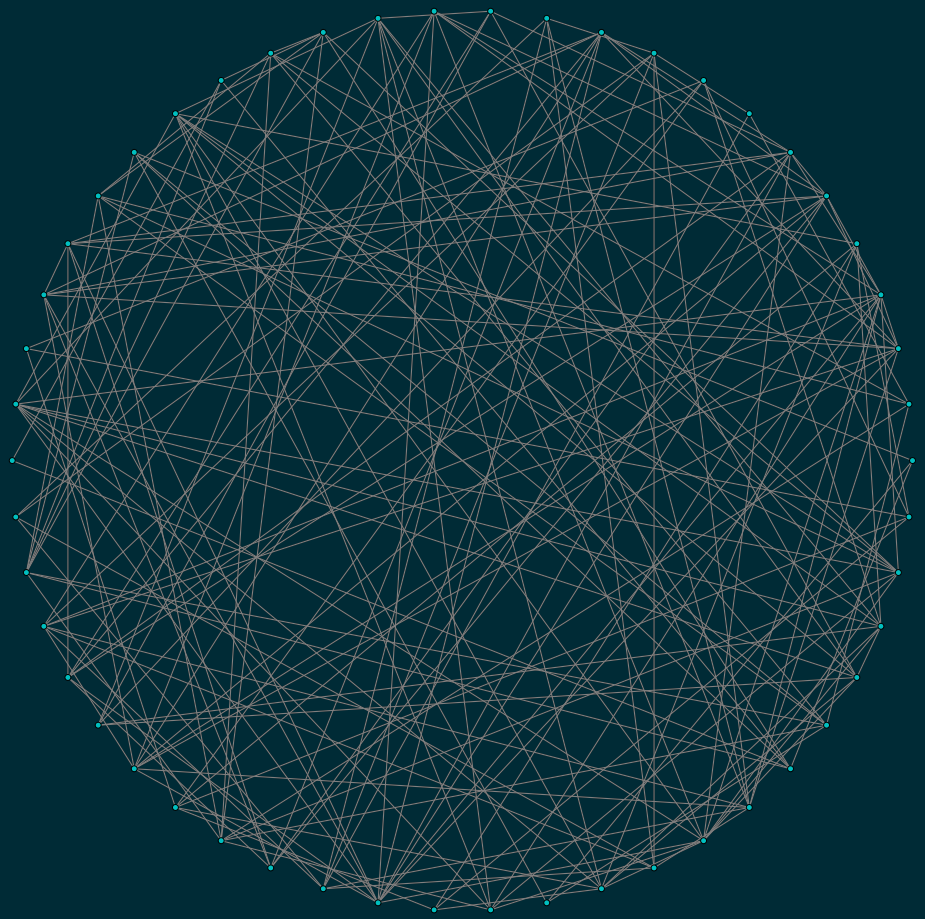
History Line



Nowak and May, 1992



What do real life interactions look like?



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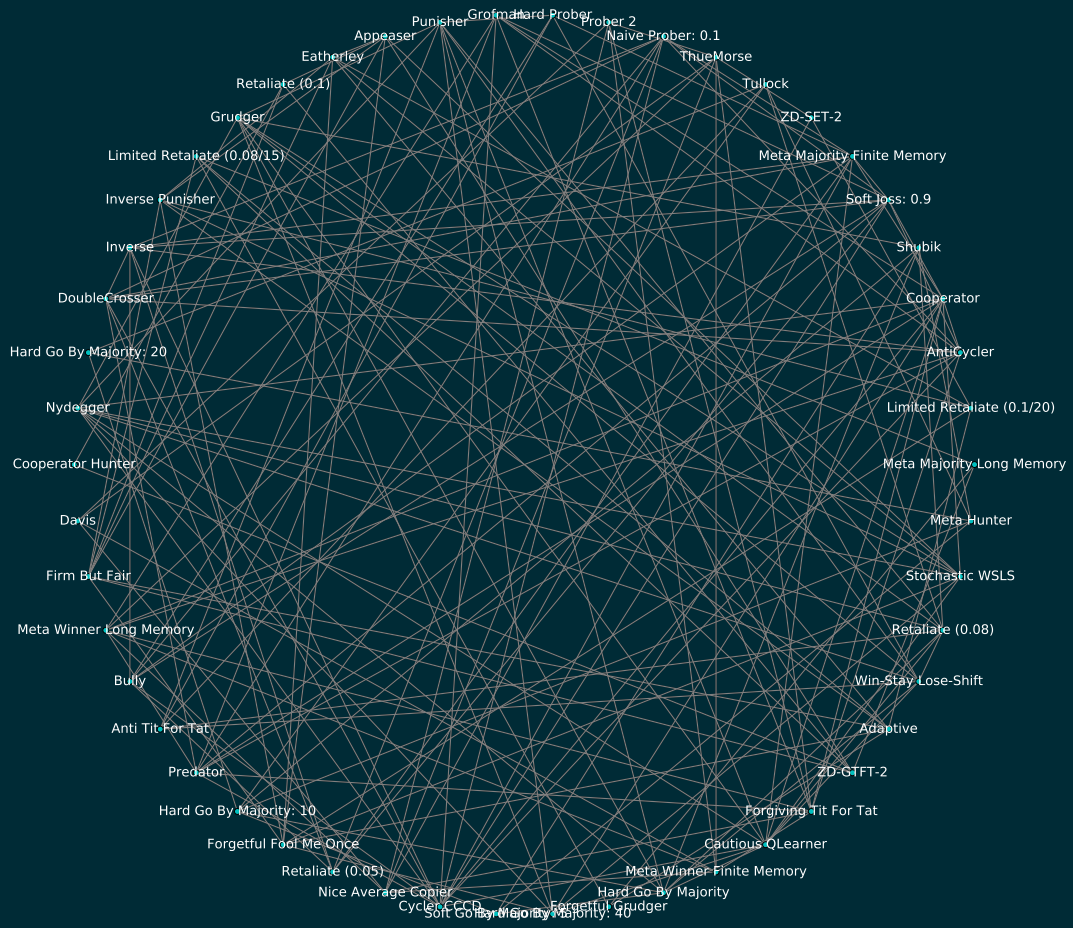
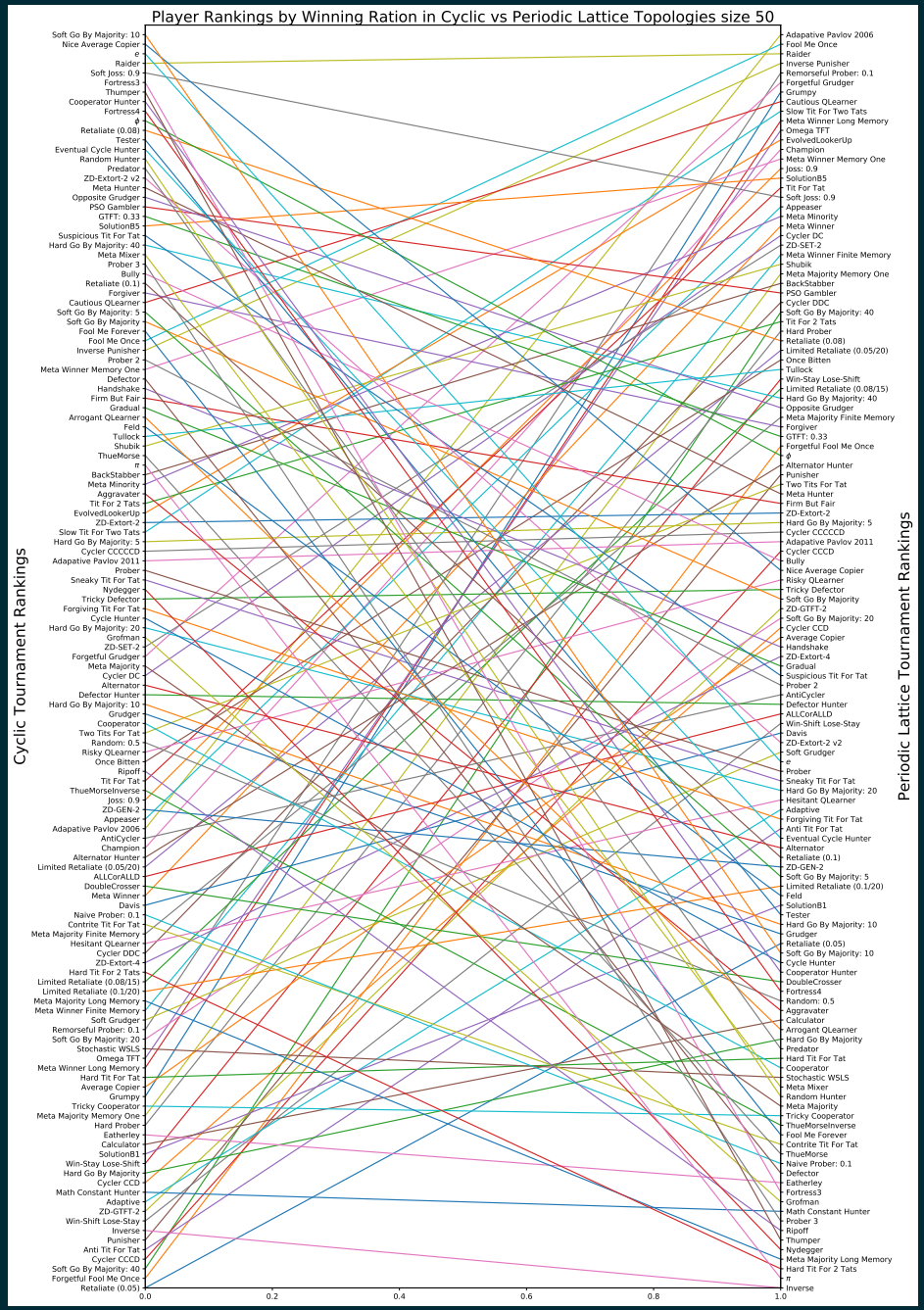
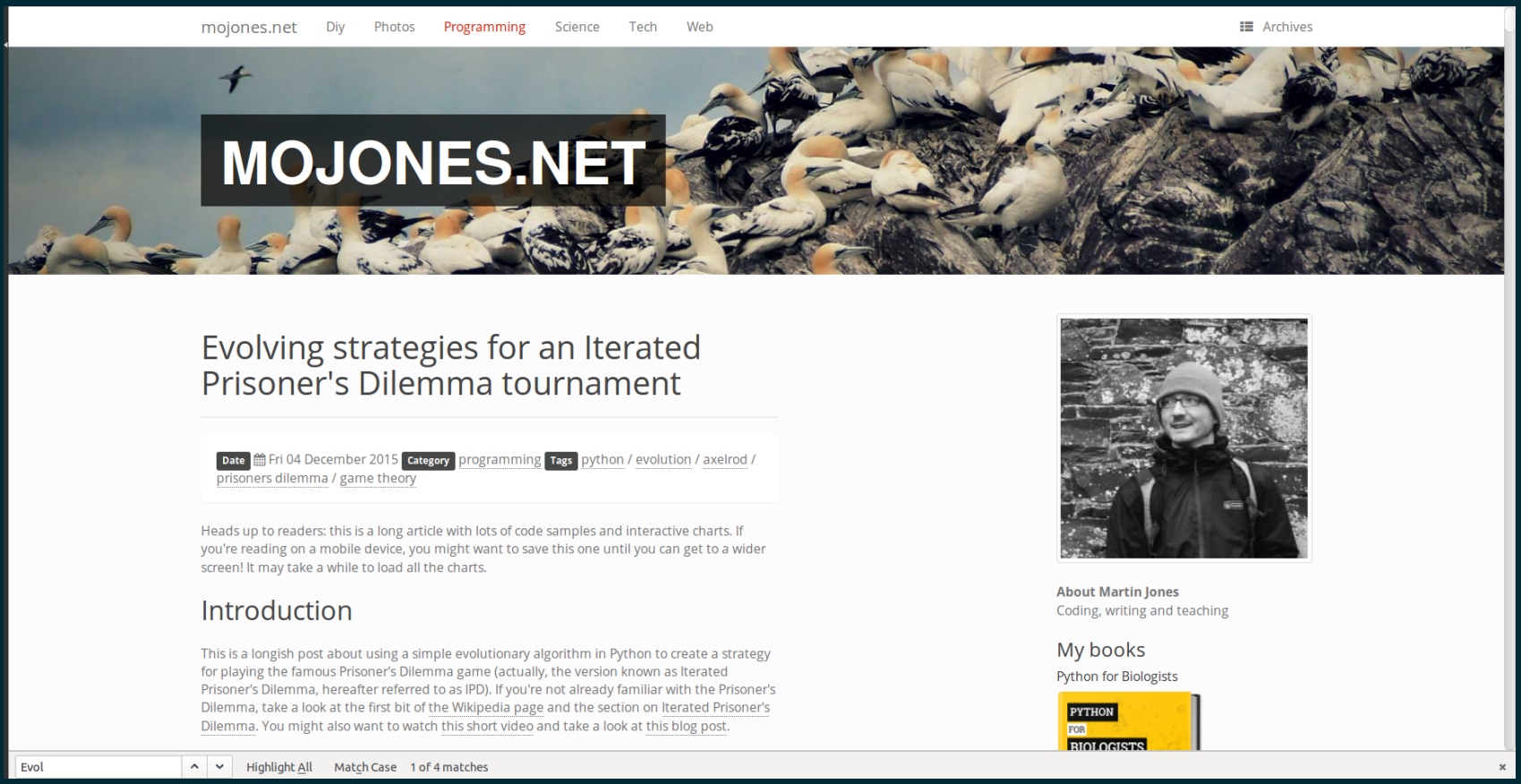
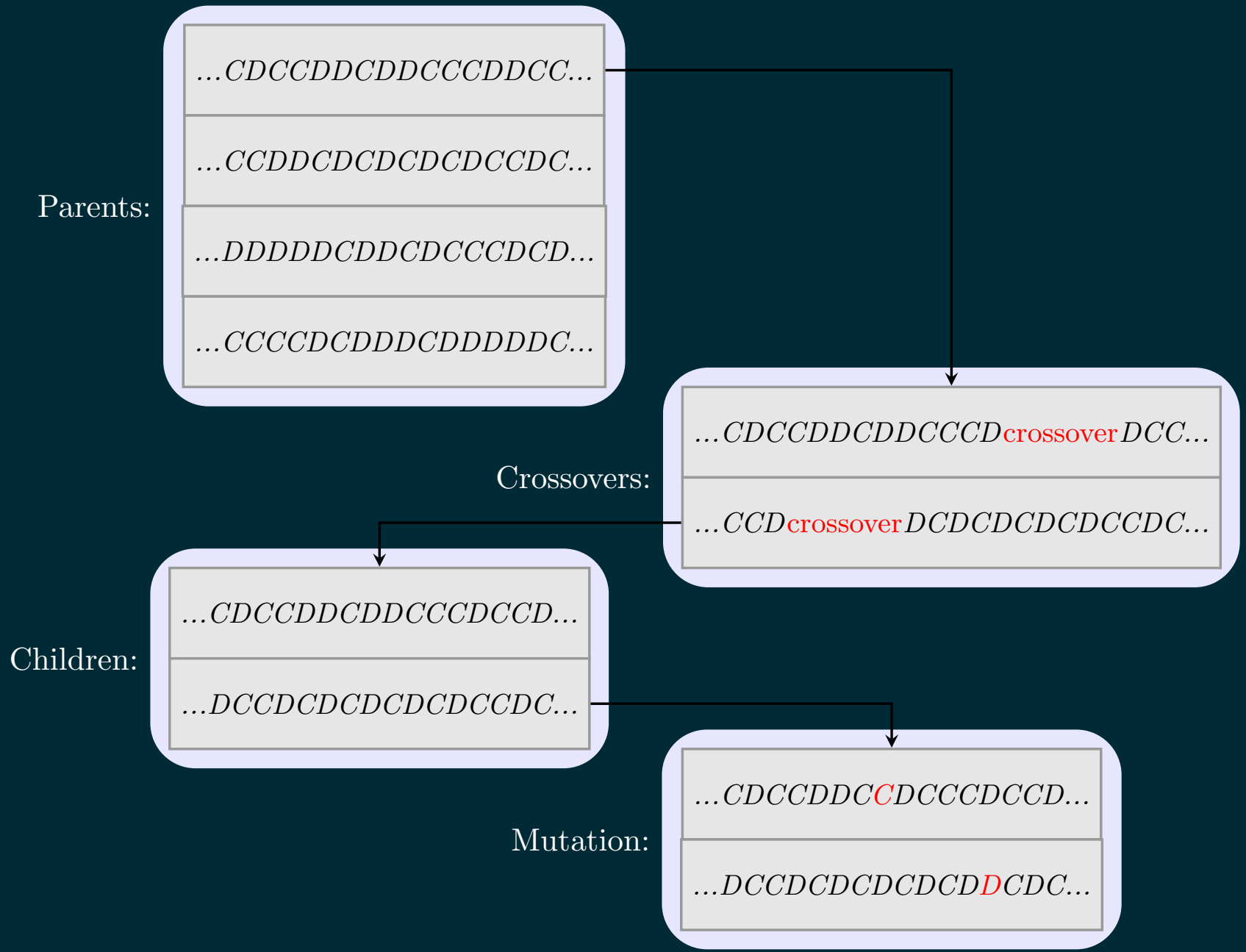


Measurements



Training a Strategy using Genetic Algorithm




Parents:
...CDCCDDCDDCCCDDCC...
...CCDDCDCDCDCDCCDC...
...DDDDDCDDCDCCCDCD...
...CCCCDCDDDCDDDDDC...
Crossovers:
...CDCCDDCDDCCCDcrossoverDCC...
...CCDcrossoverDCDCDCDCDCCDC...
Children:
...CDCCDDCDDCCCDCCD...
...DCCDCDCDCDCDCCDC...
Mutation:
...CDCCDDCCDCCCDCCD...
...DCCDCDCDCDCDDCDC...

Conclusions and Futher Research

Conclusions:

- The topology affects the strategies performance
- Using regression we can predict 2/132 strategies behaviour
- None of the 132 strategies performed well in all experiments
- For specific spatial tournaments a satisfactory strategy has been trained

Conclusions and Futher Research

Plans for PhD:

- Game Theory
- Machine Learning

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https://github.com/Nikoleta-v3
https://github.com/Axelrod-Python/Axelrod