

Intelligent Distributed Systems: Solving the Byzantine Generals Problem when Communication is Noisy

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A decorative graphic consisting of a thick teal horizontal bar, followed by a thin white horizontal bar, and then three thin white horizontal lines stacked vertically.

The problem

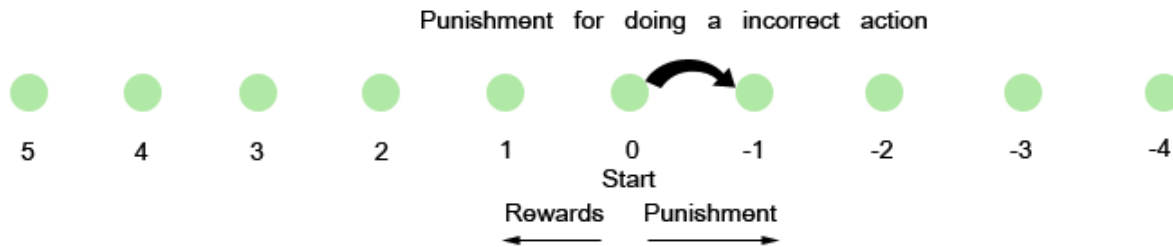
- solve the Byzantine Generals problem when the communication is noisy
- Tsetlin automaton
- Web services

Background

- Byzantine Generals
 - Reaching agreement
 - Detecting traitors
 - Noisy communication
- Learning automata
 - General
 - Tsetlin automaton

Tsetlin automaton

- Tsetlin punishment

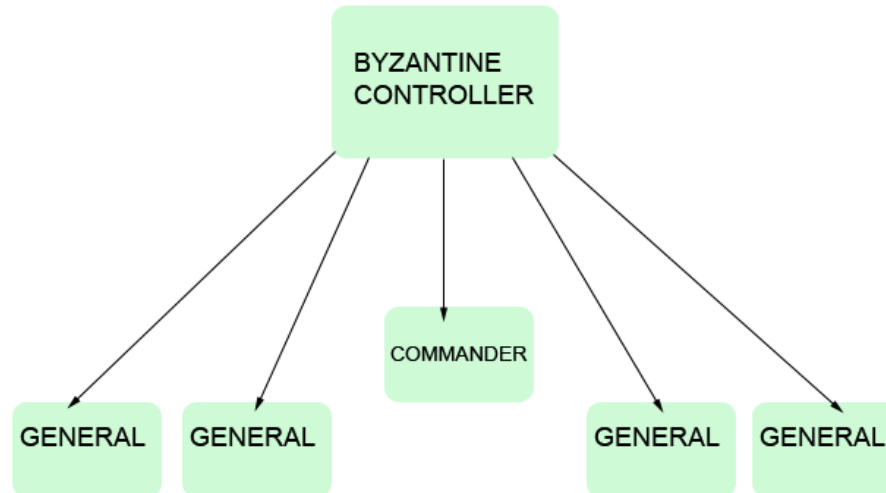


- Tsetlin rewarding



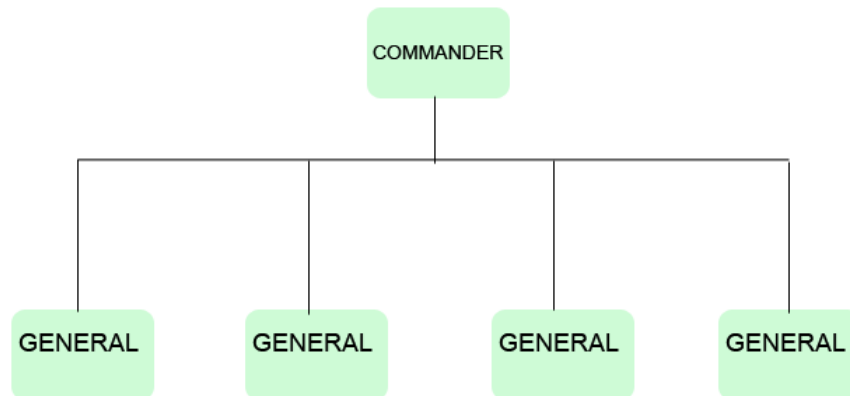
Design

- The architecture of Byzantine Controller



Design

- Communication between the nodes



Implementation

- Tsetlin implemented
 - Simple but effective

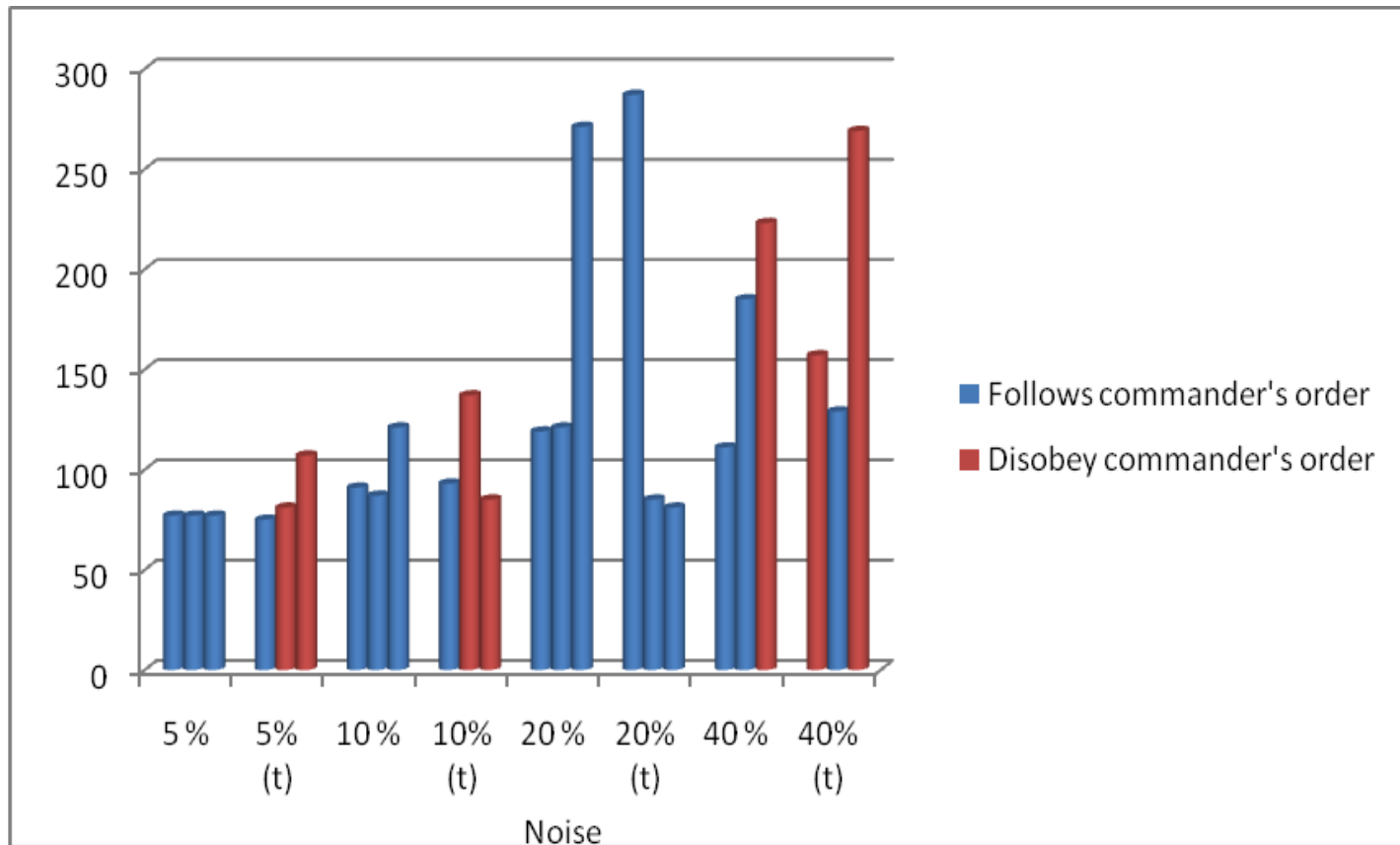
```
public void tsetlin(int order)
{
    tsetlinnumber += order;

    if (tsetlinnumber >= 75)
    {
        finalOrder = 1;
    }
    else if (tsetlinnumber <= -75)
    {
        finalOrder = 0;
    }
    else
        finalOrder = -1;
}
```

Implementation

- Simulation of noise
 - Use of random numbers
 - Noise between commander and generals
 - Noise between generals

Testing results



Discussion and conclusion

- Tsetlin can compensate noisy communication
 - Level of noise
 - Commander – General noise
- Adding Tsetlin automaton algorithm to the Byzantine Generals problem
 - prevent possible noisy communication
 - don't interfere and influence the result

Questions?