

Subset sum problem

Solving the subset sum problem using learning automata

Thomas Jager
Torbjørn Skagestad
Kristian Tveiten

Subset sum problem

- ⇒ Given a set of integers is there a non-empty subset that has the sum of zero?
- ⇒ NP-Complete.
 - Solved in polynomial time. $O(2^N \cdot N)$
- ⇒ Exact Solution
 - Cryptography (Known plain text attack)
- ⇒ Approximate Solution
 - Packing optimization

Subset sum example

Given the set $A = \{ -7, -3, -2, 5, 8 \}$ Is there a subset where the sum is 0?

$$A = \{ -7, -3, -2, 5, 8 \}$$

$$S = \{ -3, -2, 5 \}$$

$$\sum S = 0$$

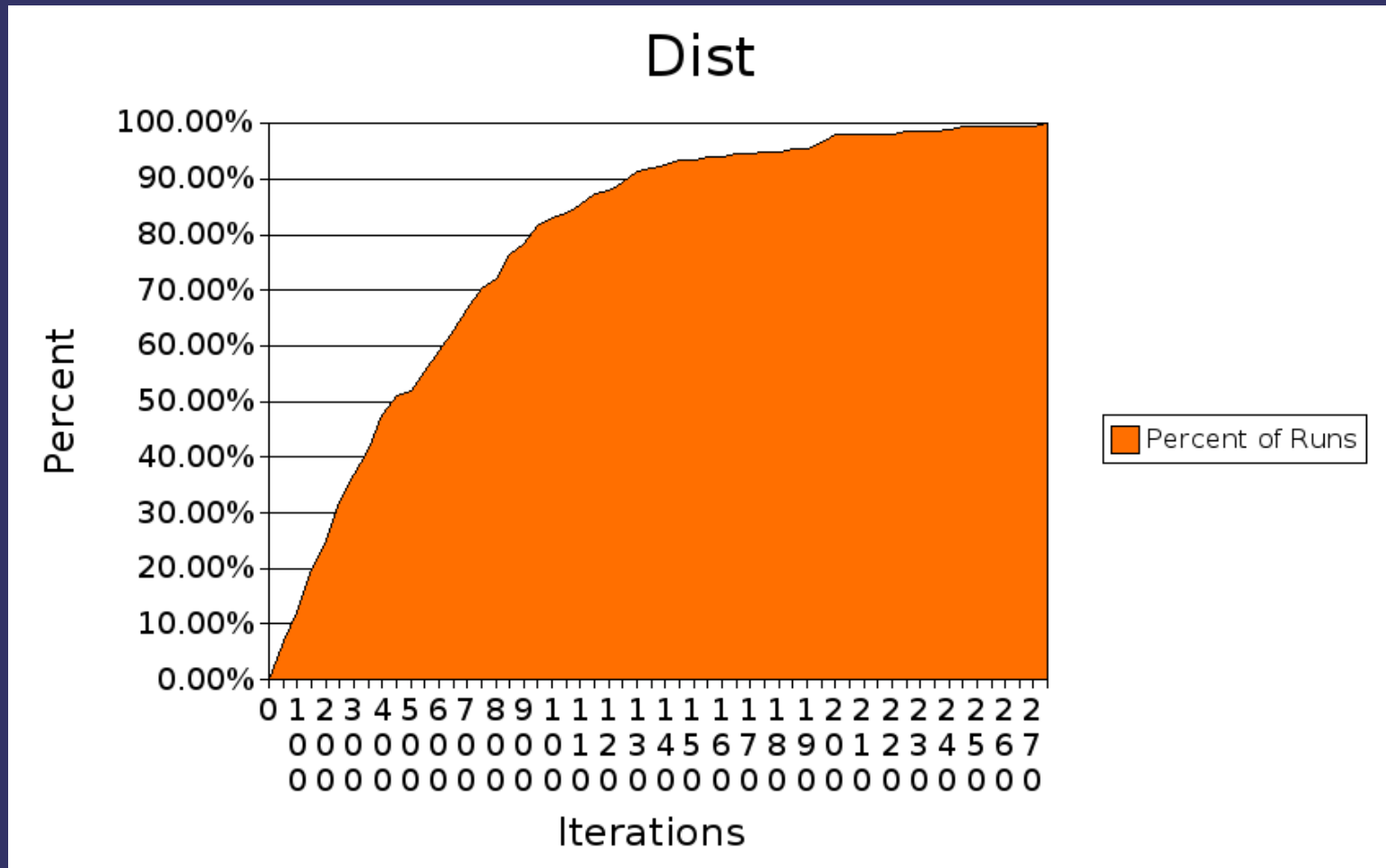
The subset $S = \{-3, -2, 5\}$ is equal to zero.

Project

- ⇒ See if a learning automata can solve the subset sum problem.
 - Try different reward/punishment strategies.
 - Try different decision strategies.
- ⇒ Compare learning automata with other algorithmic solutions.
- ⇒ Make both an exact solver and an approximation solver.

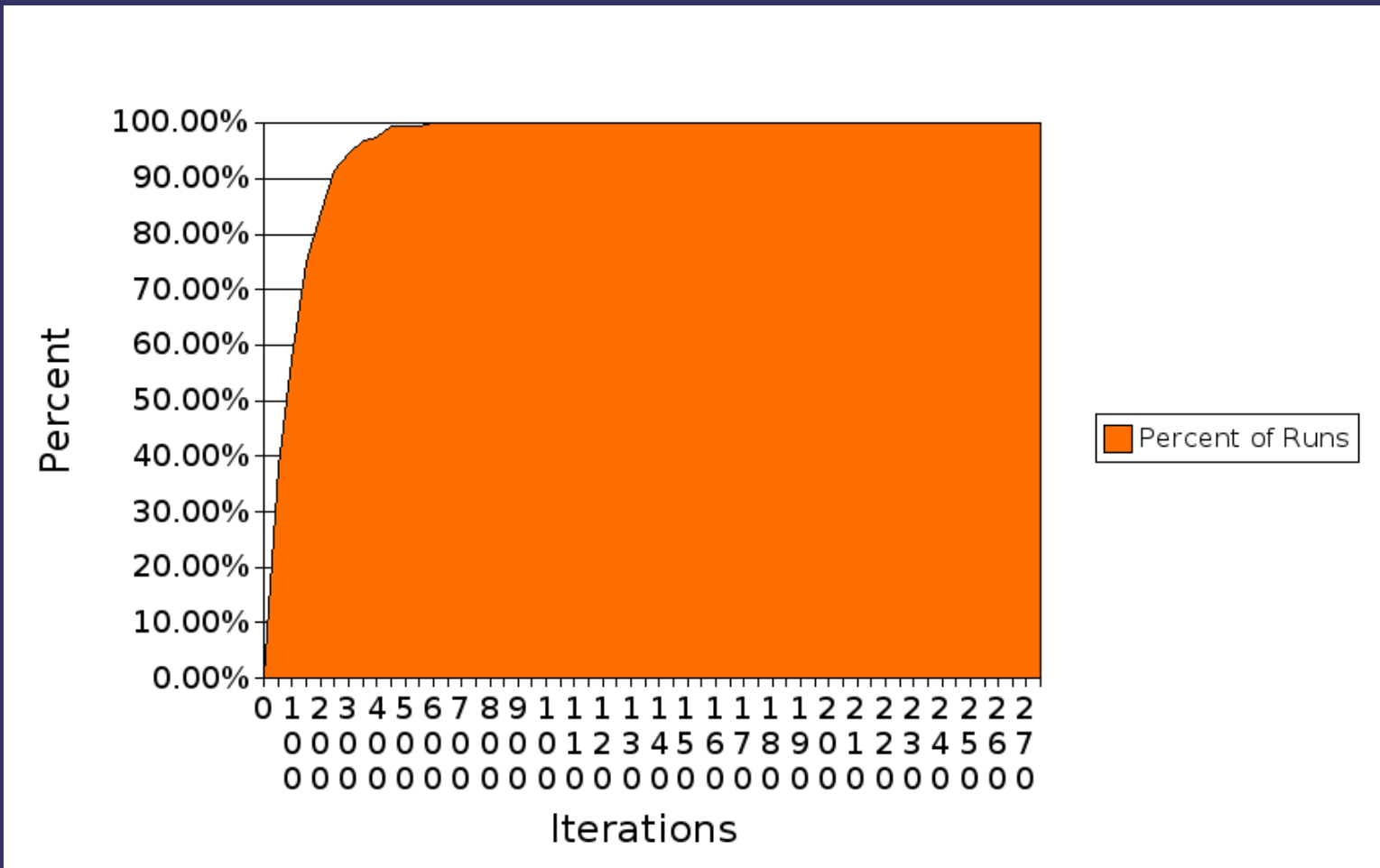
Experiments

Simple Tsetlin automata. (Set size = 400, range = -300-300)



Experiments

- ➔ Specialized Tsetlin automata. Set size = 400, range = -300-300



Questions?

➔ Thanks for listening