Synchronization, Road Coloring, and Jumps in Finite Automata

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known machine without output,
unknown state

synchronizing input

(reset word)

known machine without output,
KNOWN state

Formal models of machines:

Simple
- deterministic finite automata (DFA)
- partial finite automata
- DFA with specified uncertainty

Complex
- timed automata
- weighted automata
- others

The models describe programs, circuits, moving objects, or other systems

BAD NEWS:

- In some simple models, shortest reset words may be **exponential in number of states**
- Even for heavily restricted DFA, it is **NP-hard** to find short reset words
- Some NP-hard problems lie in FPT, but **do not admit polynomial kernels**

Publications: