

Summary: Lecture 4

Summary for the chapter 7.3 from page 150 on. [1]

Asymmetry of non-determinism

Asymmetry of nondeterministic acceptance:

- Example: find out if a formula φ is satisfiable:
 - choose truth values for the variables nondeterministically
 - check if they make φ become true
- seems to be unpractical so check whether φ is not satisfiable, because each option would have to be checked then

to check if formula is non satisfiable
question whether $NP = coNP$

similar issues in non-deterministic space:
write down n nodes on a ... non-det. will succeed if it is possible
to show that it is impossible to ... in SPACE was unsolved until the 80s
 h for function (yes or no or h ?)
 h is yes
everything that fails stops in state with no

TODO

Questions:

Immerman-Szelepcsenyi

how many distinct nodes can be reached in a graph if you start from a graph x
 $s(0)$ will contain node 1 and $s(1)$ will contain all neighbours of 1
we will have actual names
4 nested for loops and algorithm happens in the middle
outer for loop:
computes number of nodes reachable from initial node (for k steps with k as the iterative thingy in the for loop)
in each step we override the previous set with the next one because we only have limited space
second loop:
we get how far we got in the previous steps and sum up how far we can get (because we can get previous set size?)
third loop:
the actual magic happens here: checking something
Aux sounds like a port for headphones
return no when all guesses were correct? we remember solution that we were supposed to reach beforehand
it requires thinking
we can't even mark nodes (would use linear space) but with determinism we get it into $\log n$ (?)
Algorithm (2) slides seems to be important

TODO

Questions:

REACHABILITY \in NL

NL = nondeterministic logarithmic space
little bit of stuff between $\log n$ and constant but no interesting stuff

TODO
Questions:

References

- [1] Christos H. Papadimitriou. *Computational Complexity*. Addison-Wesley Publishing Company, 1994.