OVERVIEW (REVIEW)

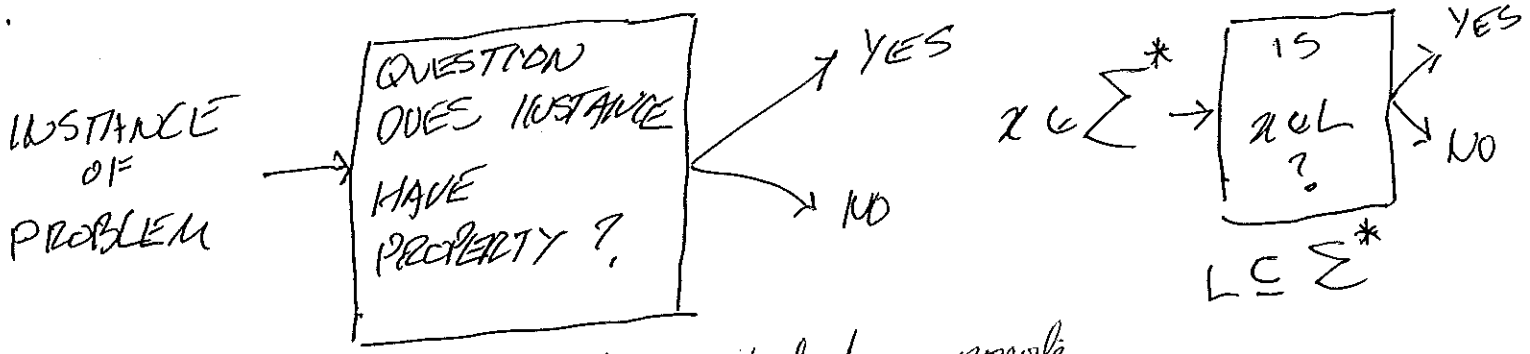
ALGORITHMIC PROBLEMS → EXPAND ON TYPES OF PROBLEMS.

FOCUS ON DECISION PROBLEMS

SIMPLIST

AS DIFFICULT AS ANY PROBLEMS

COMPUTATION / SOLUTION



instances that have properties can be considered to make up a language.

BIG QUESTIONS

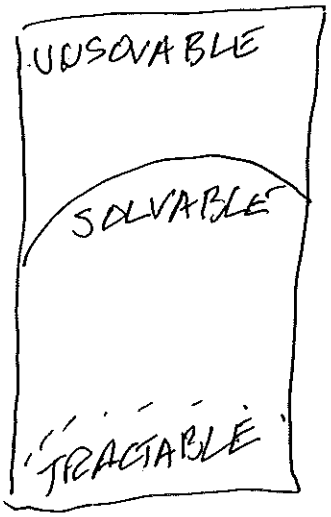
SOLUTION POSSIBLE

EFFICIENT SOLUTION POSSIBLE

FINITE AUTOMATA

PUSH DOWN AUTOMATA

TURING MACHINES



TAXONOMY OF PROBLEMS RE RESOURCES REQUIRED.

Abstract Problems.

A problem is a relation on

Set I of instances

Set S of solutions

$Q \subseteq I \times S$

Decision Problems YES NO

given a graph is it connected?

given a Boolean formula is it satisfiable?

given a positive integer is it prime?

Function Problems.

Enumeration Problem

given a Boolean formula find all satisfying assignments

given a Graph find all shortest paths

Counting Problem

given a Boolean formula how many satisfying assignments are there.

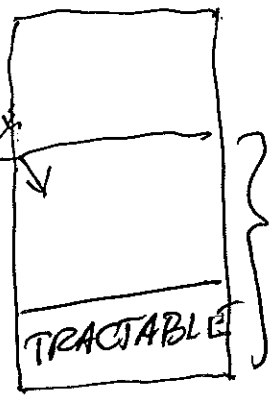
Optimization Problem

T.S.P.

Fundamental questions:

Is there an algorithm that solves problem?

Is there an efficient alg that solves problem?



Machine Models of Computation.

SYNTACTIC

DFA

NFA

NFA ε MOVES

NO MEM

ε-NFA

REGULAR EXPRESSIONS

2DFA

PDA

CONTEXT FREE GRAMMARS & LANGUAGES

PUSH DOWN STACK MEM

TURING MACH

MEM

UNRESTRICTED GRAMMARS

$\alpha \rightarrow \beta$

CONSTRUCTIONS

CONVERSIONS

PRODUCT CONSTRUCTION — MT 1

SUBSET CONSTRUCTION — MT 2

(E-NFA TO NFA) — NOTES

R.E. TO E-NFA
(DFA TO R.E.) } KLEENE'S THM

MINIMIZING STATES — HANDOUTS

DFA TO CFG — HANDOUTS

CFG TO CNF — HANDOUTS CHOMSKY N.F.

CFG TO PDA — NOTES

(CKY) — HANDOUTS