Lecture 25

CSE 331

Oct 30, 2017

Late Grading

Mid term 2 should be done by today

Temp grades assigned by tomorrow

HW 5 grading is delayed (in a couple of days)

Kruskal's Algorithm

Joseph B. Kruskal

Input: $G=(V,E)$, $c_e > 0$ for every e in E

$T = \emptyset$

Sort edges in increasing order of their cost

Consider edges in sorted order

If an edge can be added to T without adding a cycle then add it to T

Prim's algorithm

Similar to Dijkstra's algorithm

Input: $G=(V,E)$, $c_e > 0$ for every e in E

$S = \{s\}$, $T = \emptyset$

While S is not the same as V

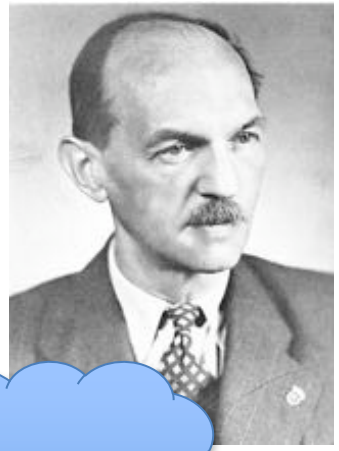
Among edges $e= (u,w)$ with u in S and w not in S, pick one with minimum cost

Add w to S, e to T

(Old) History of MST algorithms

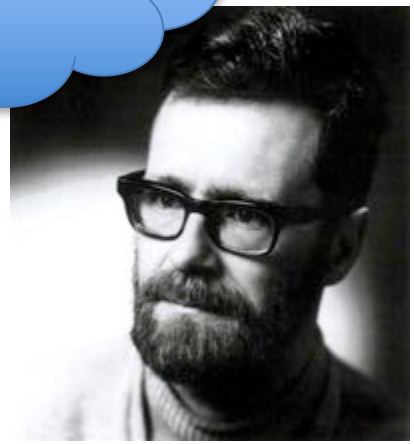
1920: Otakar Borůvka

1930: Vojtěch Jarník



Same algo!

1956: Kruskal

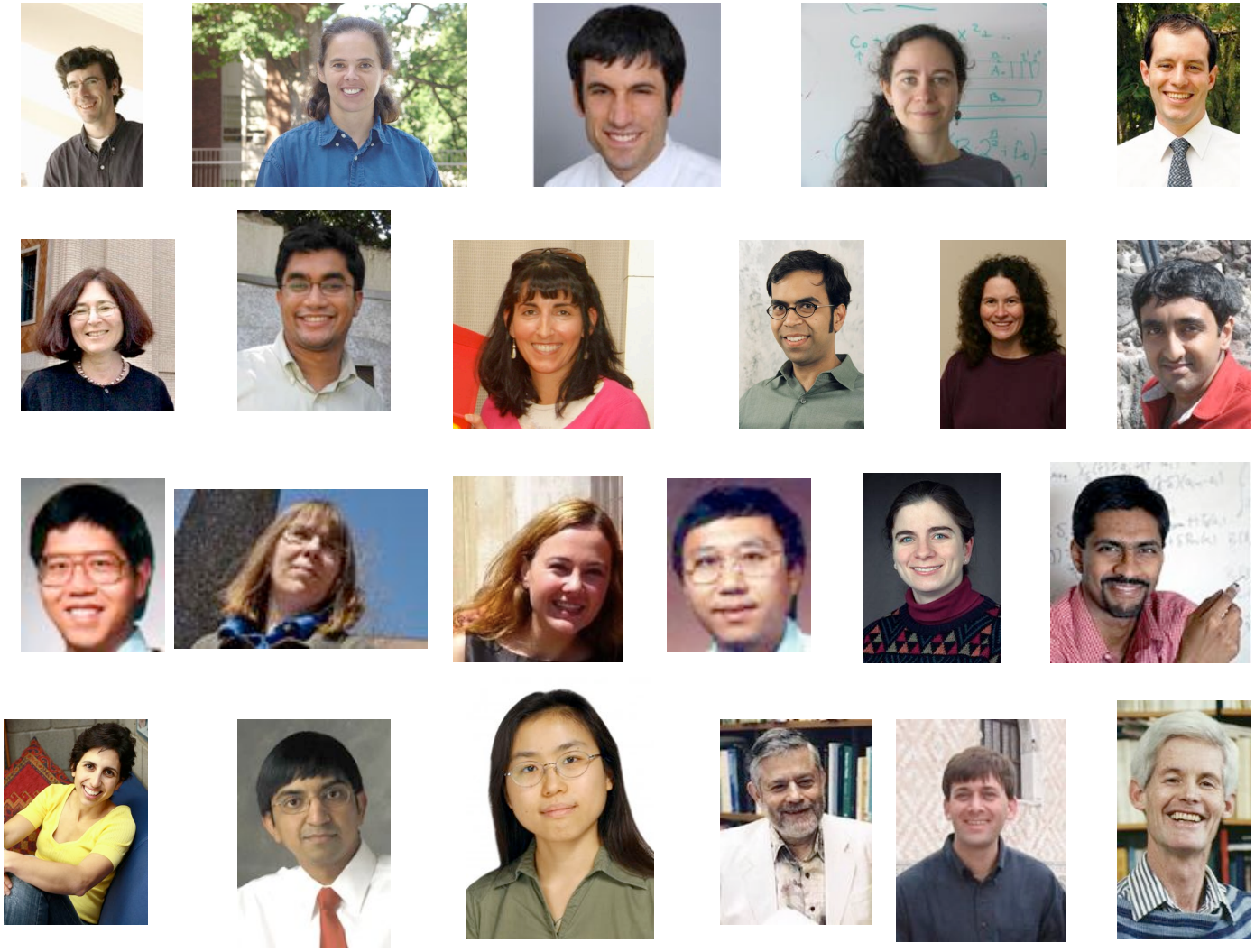


1957: Prim

1959: Dijkstra

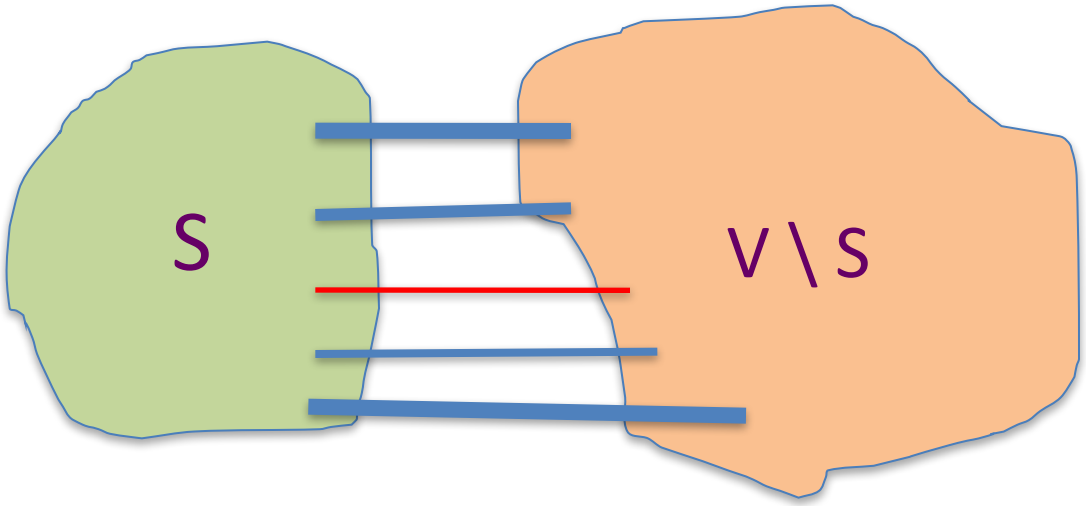
Some modern Algo Researchers

Can you guess the common link?



Cut Property Lemma for MSTs

Condition: S and V\S are non-empty



Cheapest crossing edge is in **all** MSTs

Assumption: All edge costs are distinct

Today's agenda

Prove Cut Property Lemma

Prove correctness of Prim's+Kruskal's algorithm using Cut Property Lemma