Tree Path Labeling of Path Hypergraphs

A Generalization of Consecutive Ones Property

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as part of **M. S.** by Research
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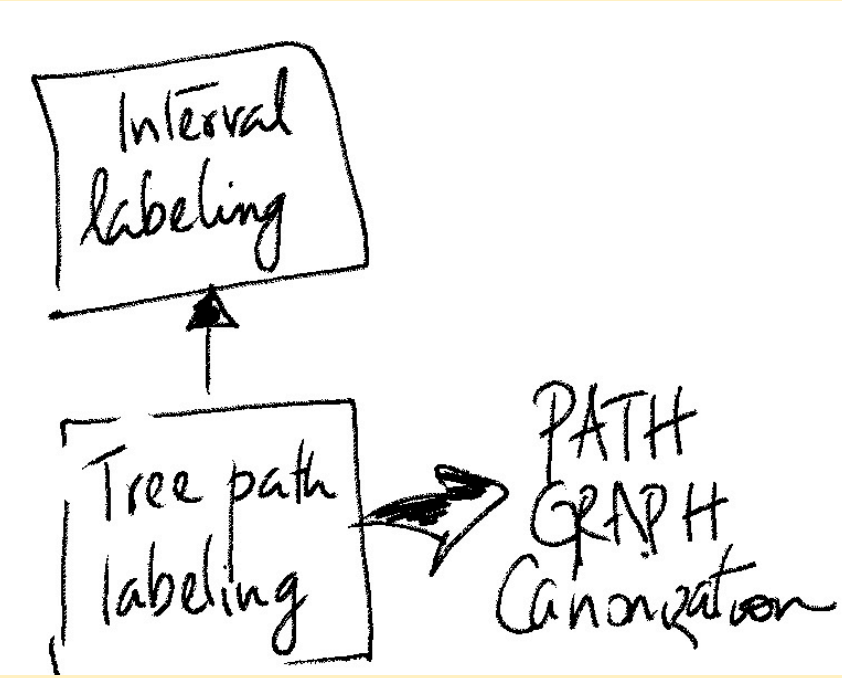
The Motivation

consecutive ones → tree path labeling

[get a better image! break it down into overlays]



An Illustration

An Illustration
of Tree Path Labeling problem

Study Group Accommodation problem

[ONLY DIAGRAMS.
a venn diagram of just the universe
a venn diagram of the grouping]

Study Group Accommodation problem

[repeat the venn diagram of the grouping (before this bullet)] [image of infinite loop]

The problem

How should the students be allocated apartments such that each study group has the least distance to travel for a discussion?

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Additional condition

Students in a group should form a path.

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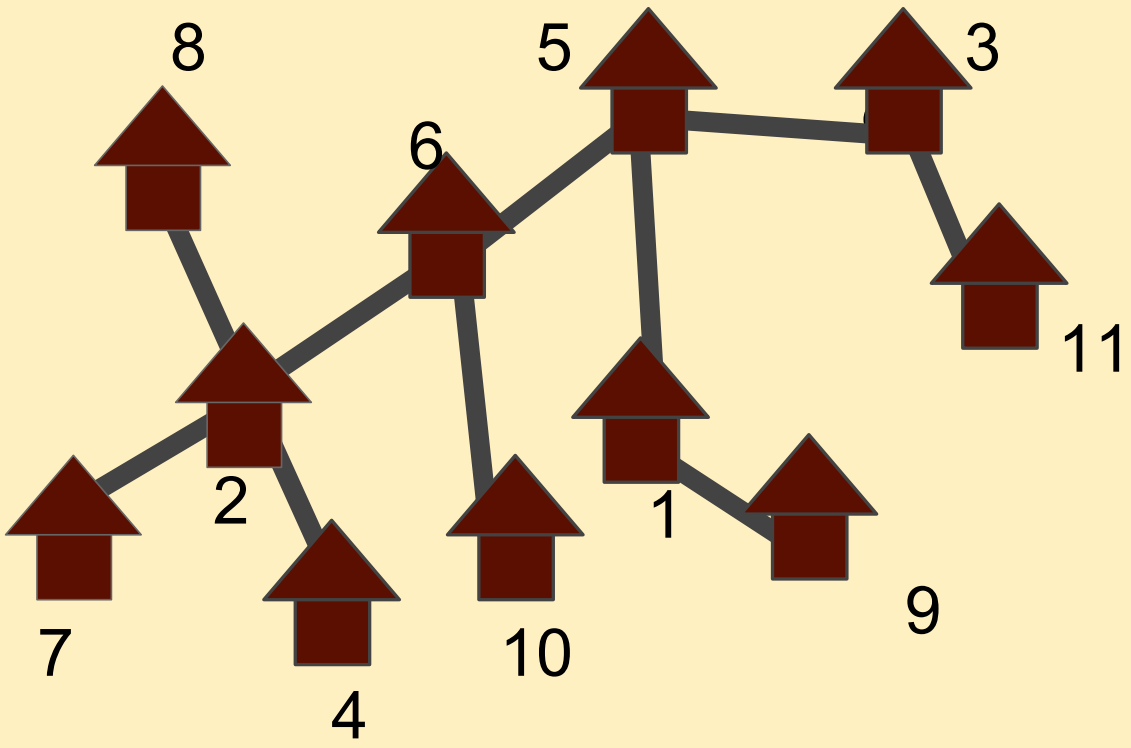
Additional condition

Students in a group should form a path.
Else, it is *a subtree labeling problem.*

Study Group Accommodation problem

[update to the example in synopsis doc]



Study Group Accommodation problem

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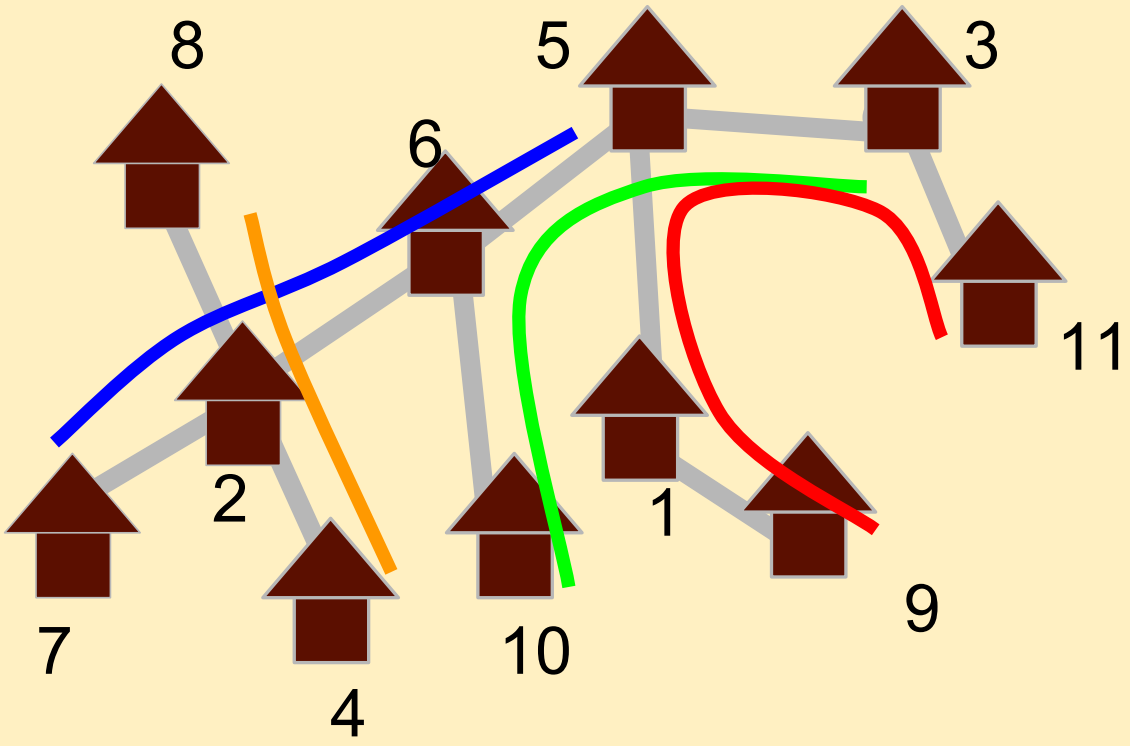

Study Group Accommodation problem

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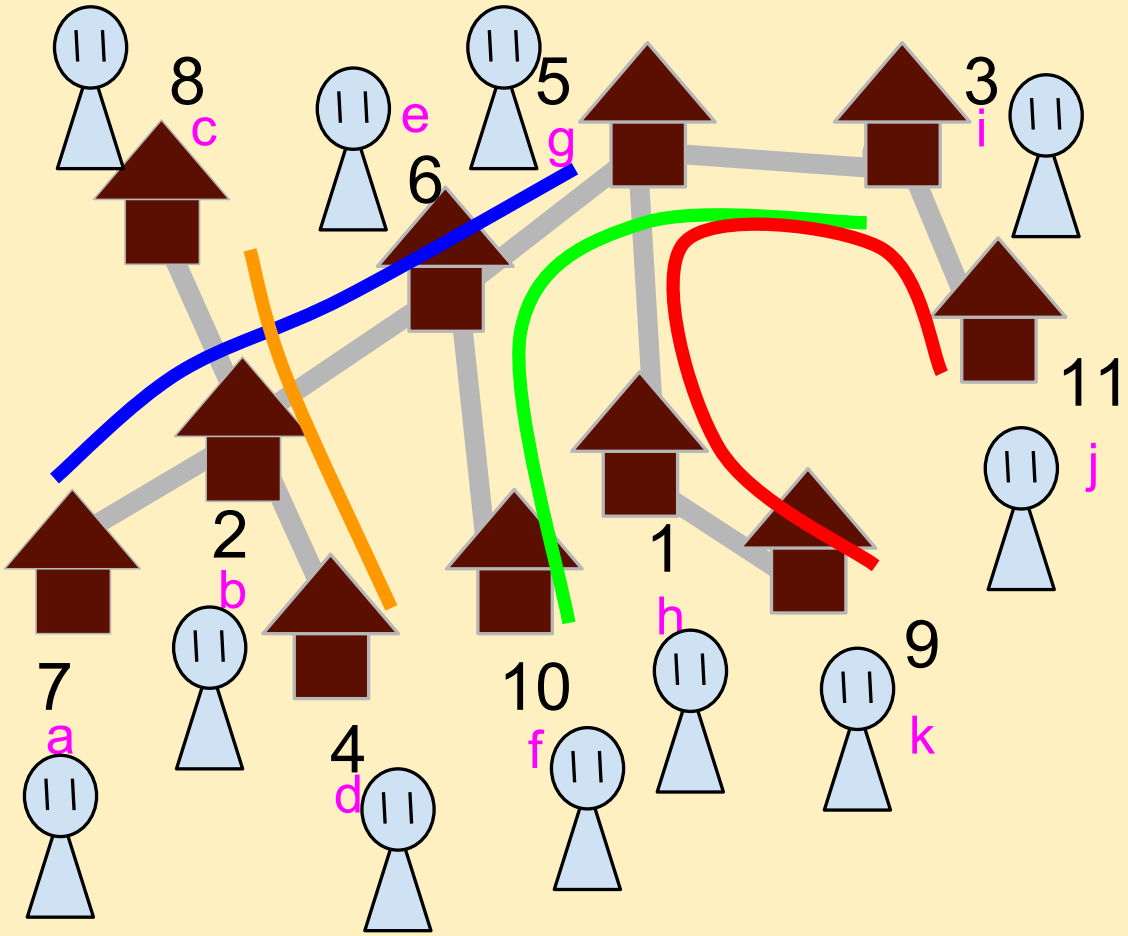

Basic terminology

a crash course on the TPL machinery

[HAVE CORRESPONDING PREVIOUS IMAGES REPEATED]

The set of study groups $\{\mathbb{B}, \mathbb{T}, \mathbb{W}, \mathbb{F}\} \rightarrow$ Hypergraph

Basic terminology

a crash course on the TPL machinery

[HAVE CORRESPONDING PREVIOUS IMAGES REPEATED]

Infinite Loop block $\longrightarrow$ Target tree

Basic terminology

a crash course on the TPL machinery

[HAVE CORRESPONDING PREVIOUS IMAGES REPEATED]

Study group path allocation $\longrightarrow$ (FEASIBLE) TREE PATH LABELING

Basic terminology

a crash course on the TPL machinery

[HAVE CORRESPONDING PREVIOUS IMAGES REPEATED]

The apartment allocation $\longrightarrow$ Path Hypergraph Isomorphism

The problems studied

1. Computation

Computation of a (feasible) tree path labeling (TPL) if any.

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2. Computation on *k*sub stars

Computation of a (feasible) TPL if any, if target tree is a k-subdivided star.

The problems studied

1. Computation

Computation of a (feasible) tree path labeling (TPL) if any.

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Computation of a (feasible) TPL if any, if target tree is a k-subdivided star.

3. Characterization

Characterization of a (feasible) TPL and finding the certificate for feasibility - the hypergraph isomorphism

We will see the problems in LIFO order.

3.

3.

Characterization

The characterization

ICPPL + a filtering algorithm

a: [TBD Write the theorem]

The characterization

ICPPL + a filtering algorithm

[a]: [TBD Write the theorem]

Special case

Interval assignment problem / COP

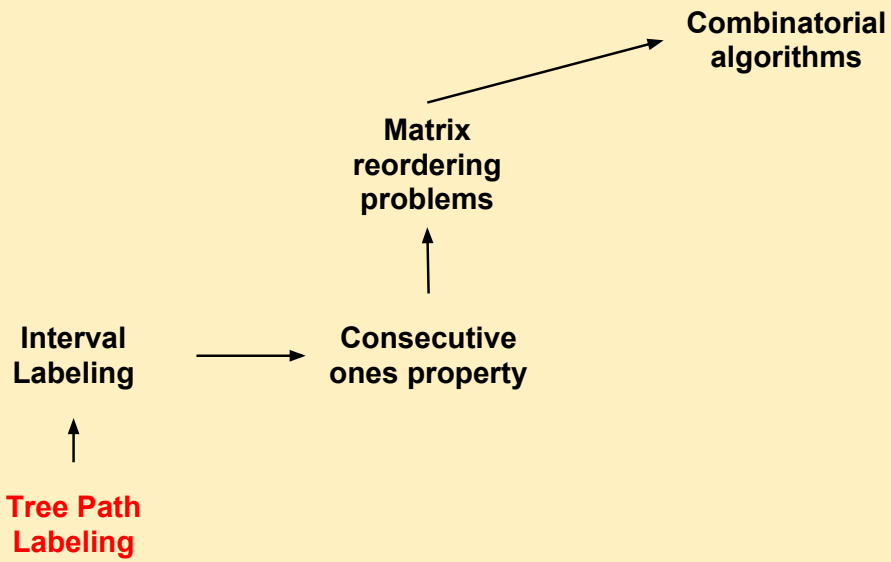
1. T is a path $\Longrightarrow$ paths in T are intervals [a: [quick illustration]]
2. Only pairwise intersection cardinality needs to be preserved $\Longrightarrow$ ICPIA [NS09]
3. Higher level intersection cardinalities preserved by **Helly Property** – [Gol04]
4. *filter_1*,*filter_2* do not need the the **exit** conditions. [a: [is this cryptic?]]

This problem is equivalent to Consecutive Ones Property of binary matrices [NS09]

Path Labeling $\longrightarrow$ Graph Isomorphism

Application

[get a better image!]



Path Labeling → Graph Isomorphism

Application

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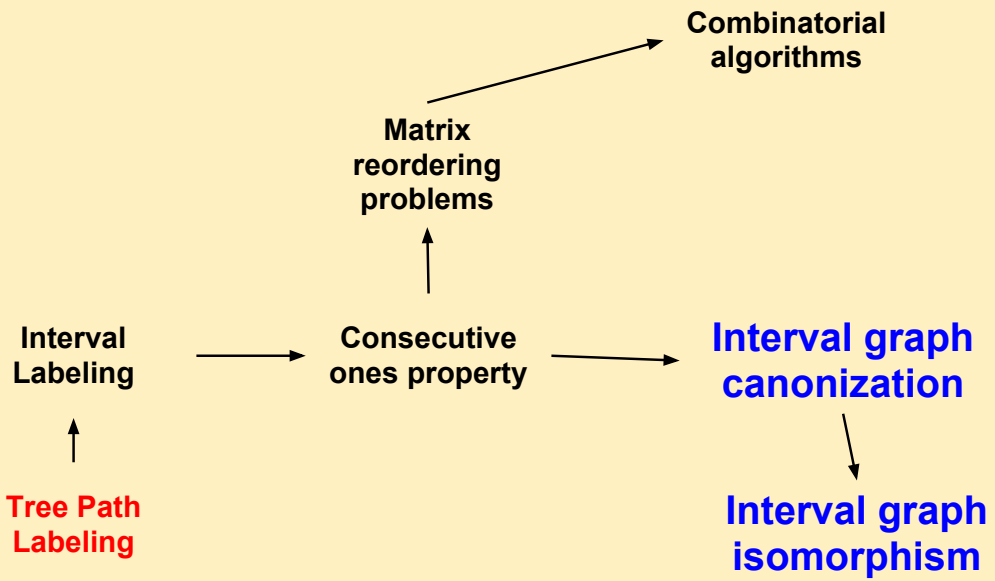

Path Labeling $\longrightarrow$ Graph Isomorphism

Application

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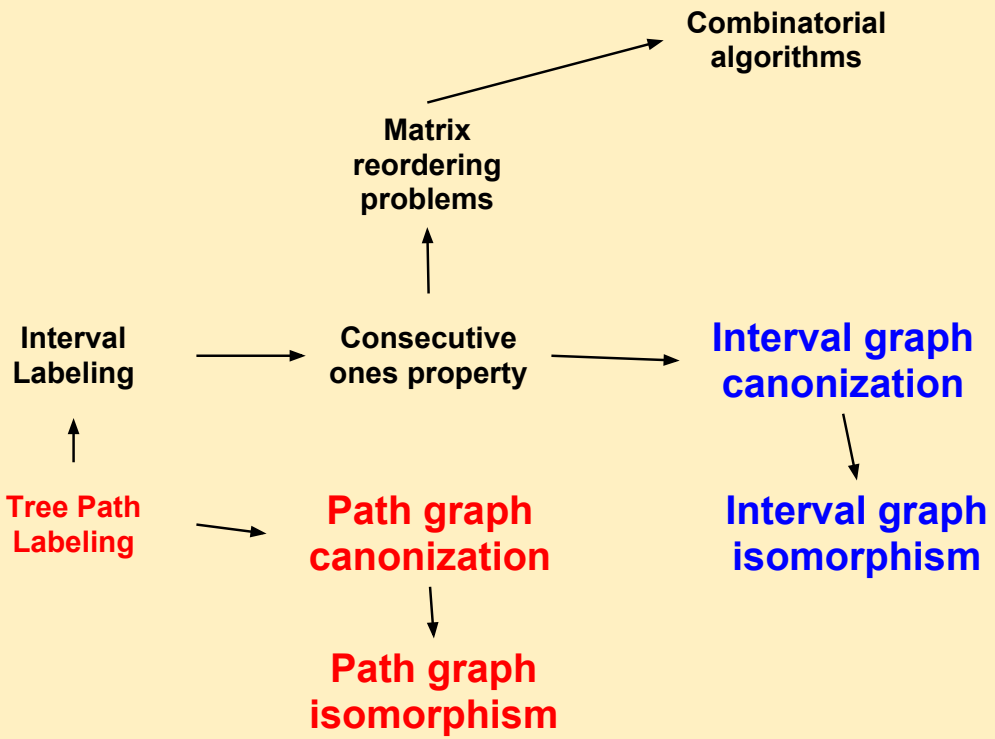

Thank You

Q & A

References

[improve - add some jazz. this is a notional slide only for offline reference.]

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