Presentation of intermediate results

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Overleaf

Formulations

We compare the different formulations proposed by Solyalı and Süral [1] as well as Cunha and Melo [2].

Solyalı, O., Süral, H. The one-warehouse multi-retailer problem: reformulation, classification, and computational results, Ann Oper Res 196, 517–541 (2012).

Cunha, Jesus O., Melo, Rafael A. On reformulations for the one-warehouse multi-retailer problem. Annals of Operations Research, 99-122 (2016).

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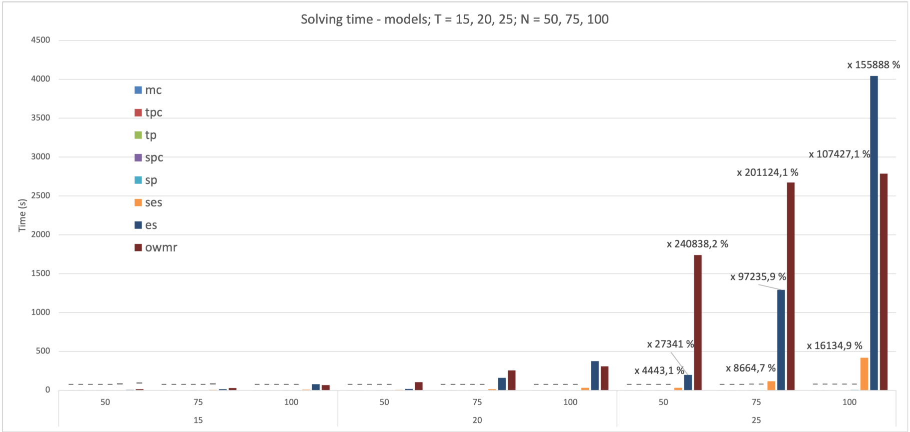
No restrictions on ordering periods - all models

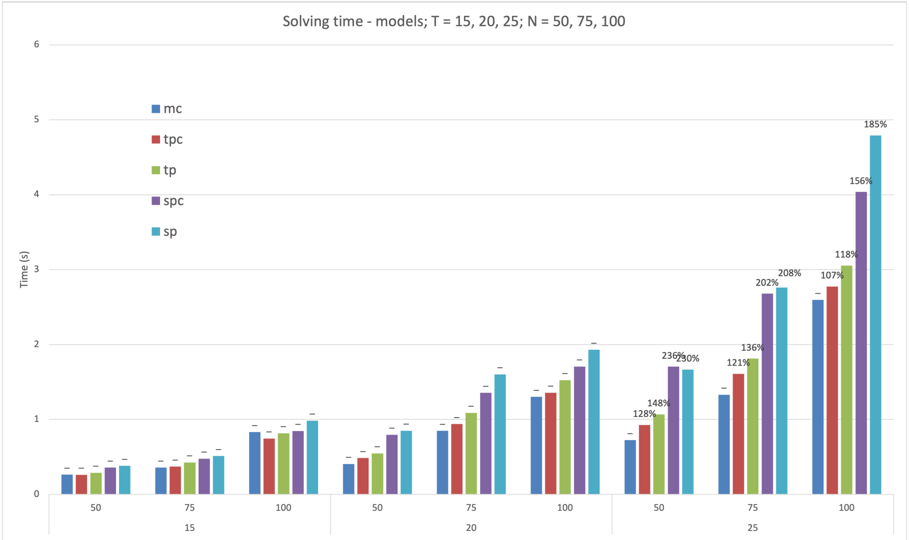


No restrictions on ordering periods - all models

Observations

Formulations OWMR, ES and SES are very ineffective compared to other formulations

No restrictions on ordering periods - 5 fastest models

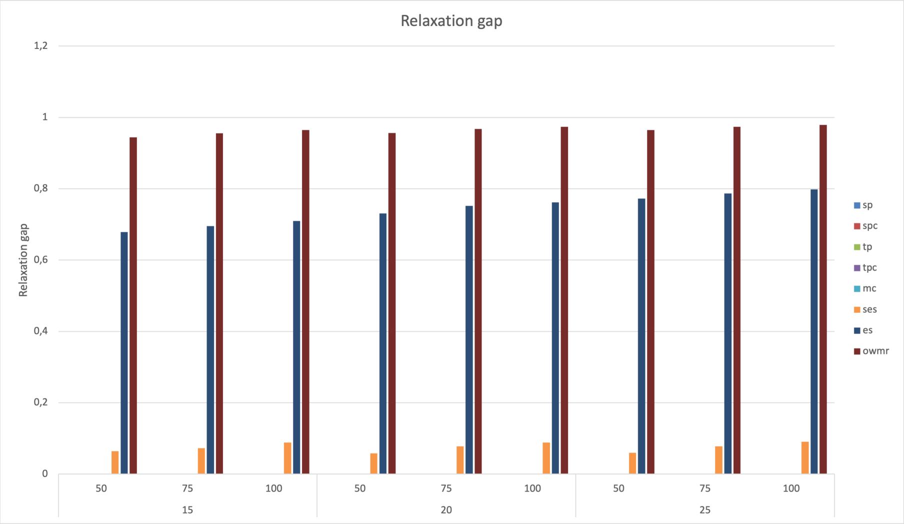


No restrictions on ordering periods - 5 fastest models

Observations

MC is our most effective formulation

No restrictions on ordering periods - relaxation gap

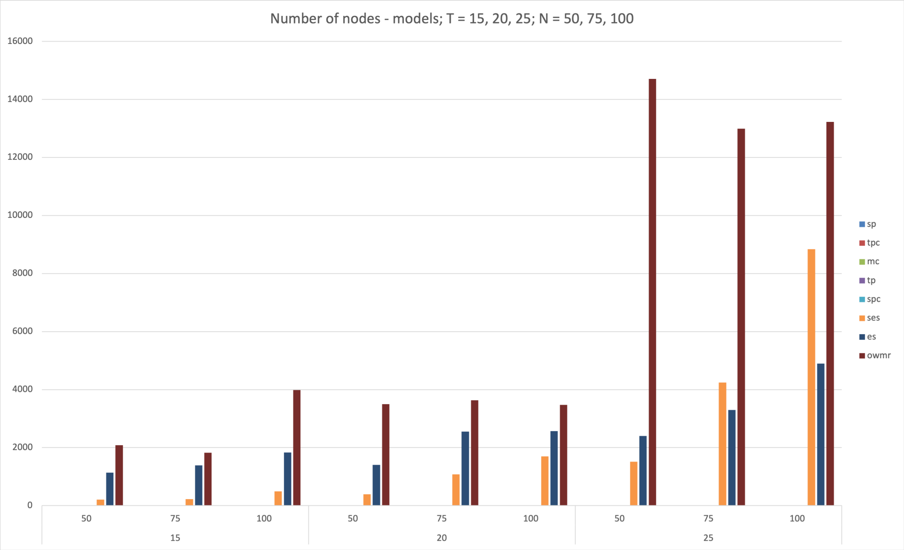


No restrictions on ordering periods - 5 fastest models

Observations

ES, SES and OWMR are not very efficient formulations. No significant results for the other models' relaxation gap.

No restrictions on ordering periods - nodes



No restrictions on ordering periods - nodes

Observations

OWMR increases more than SES. ES more stable.

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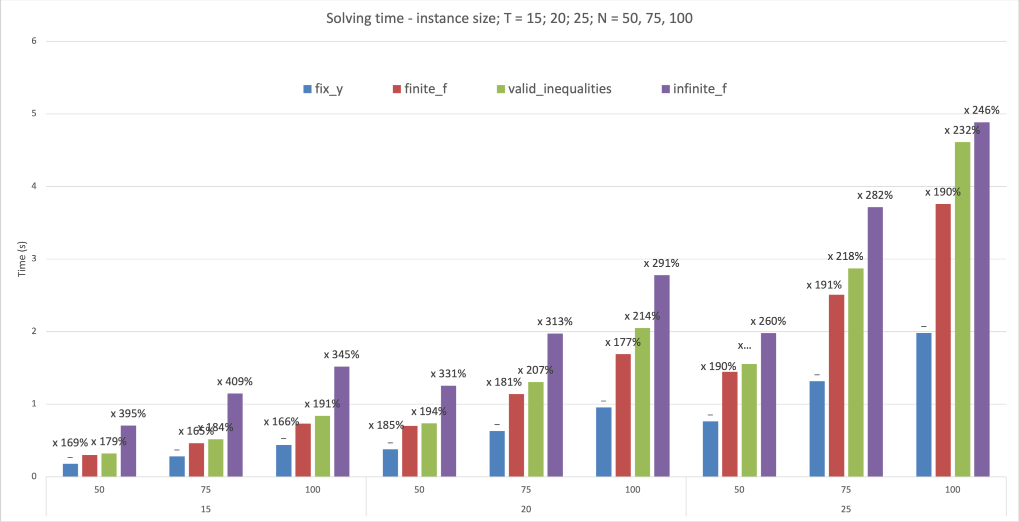
Fixed ordering periods - methods with size

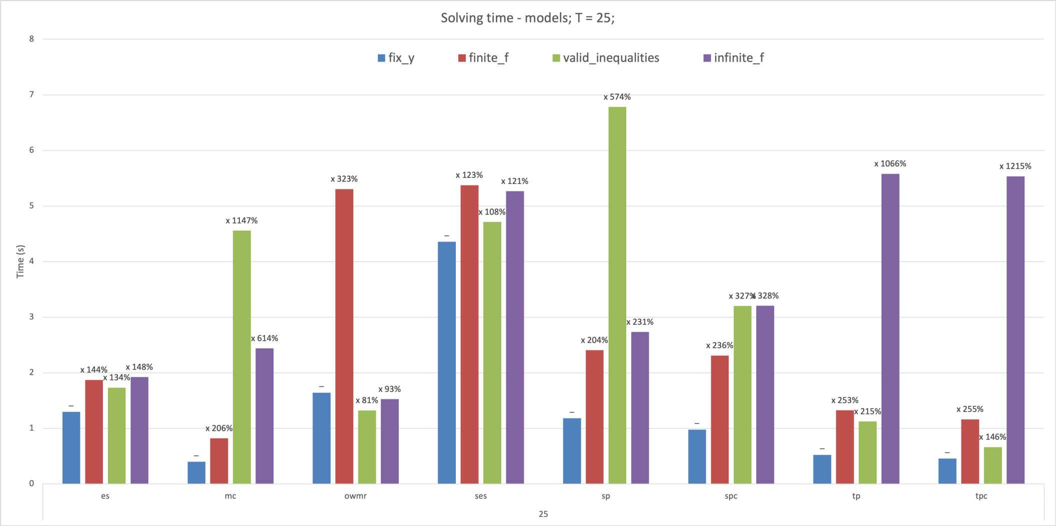


Fixed ordering periods - methods with size

Observations

The most effective method is the method fixing the variables y.
The less effective method is setting the parameters f to an infinite value, causing to add large parameters in the problem.
Here all the models are mixed, as well as the parameter to decide on the intervals' length.

Fixed ordering periods - models behaviour

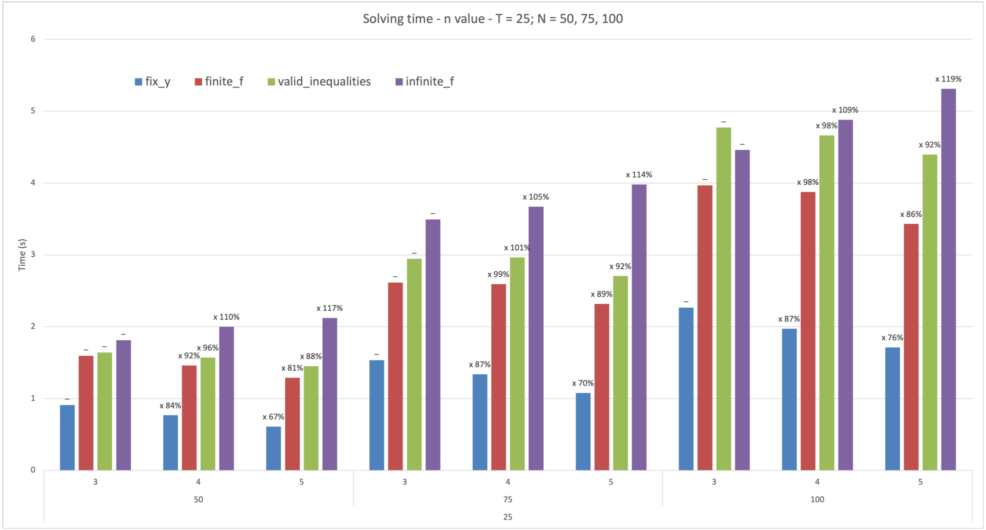


Fixed ordering periods - models behaviour

Observations

The models yield different solving times with the formulation.
ES more balanced.
MC : not efficient with valid inequalities
OWMR most effective with the valid inequalities method.
SP not efficient with valid inequalities.
Transportation-based models become significantly less effective with the infinite method.
Most effective between finite f and valid inequalities is not clear.
Why?

Fixed ordering periods - evolution with n



Fixed ordering periods - evolution with n

Observations

The infinite f method solving time increases when there are more forbidden periods (+ 20 %)
Other methods decrease (- 20 %)
for fix y: less constraints; finite f : lower value for f

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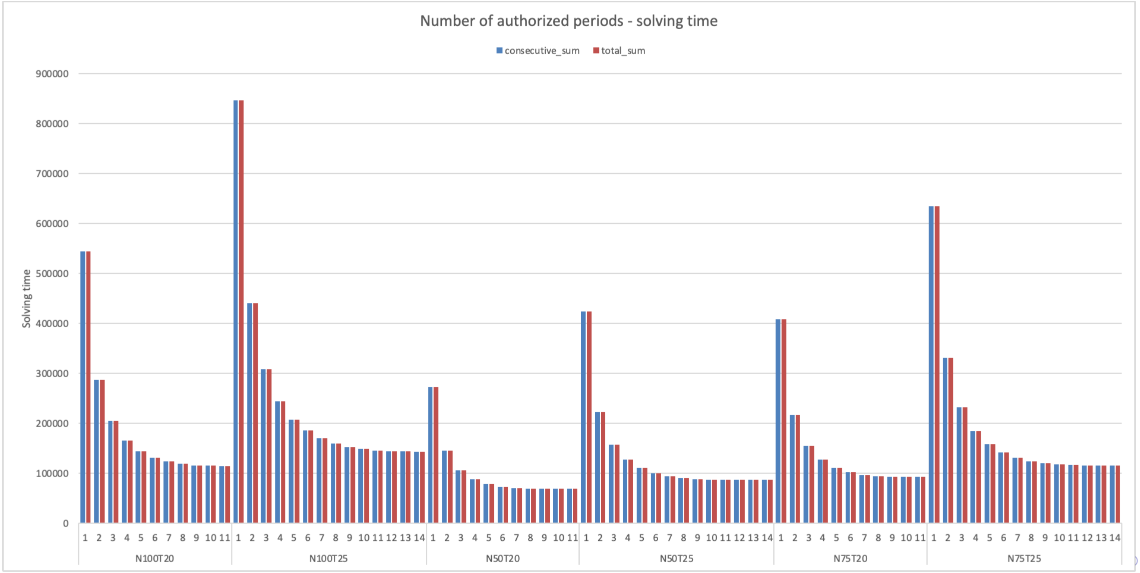
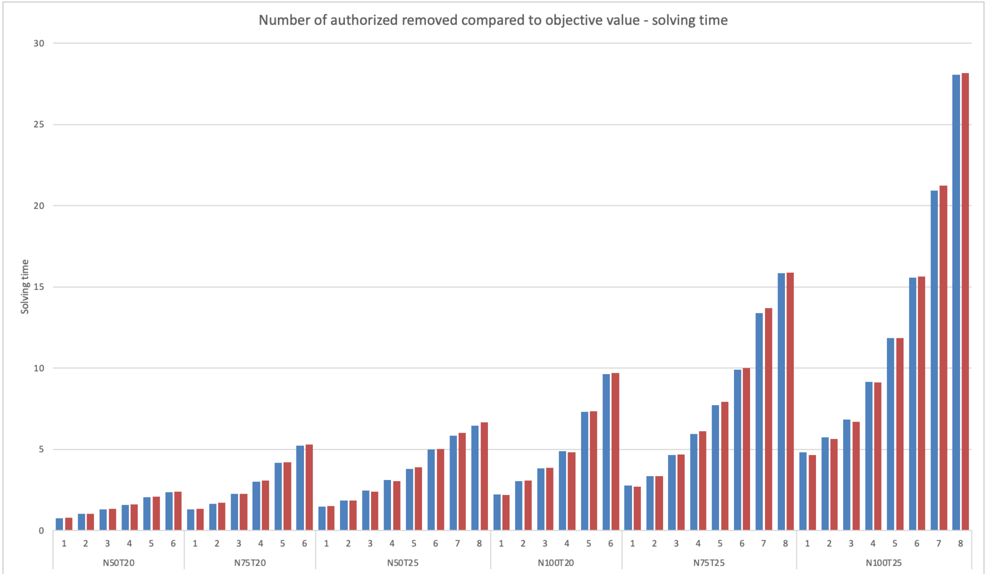
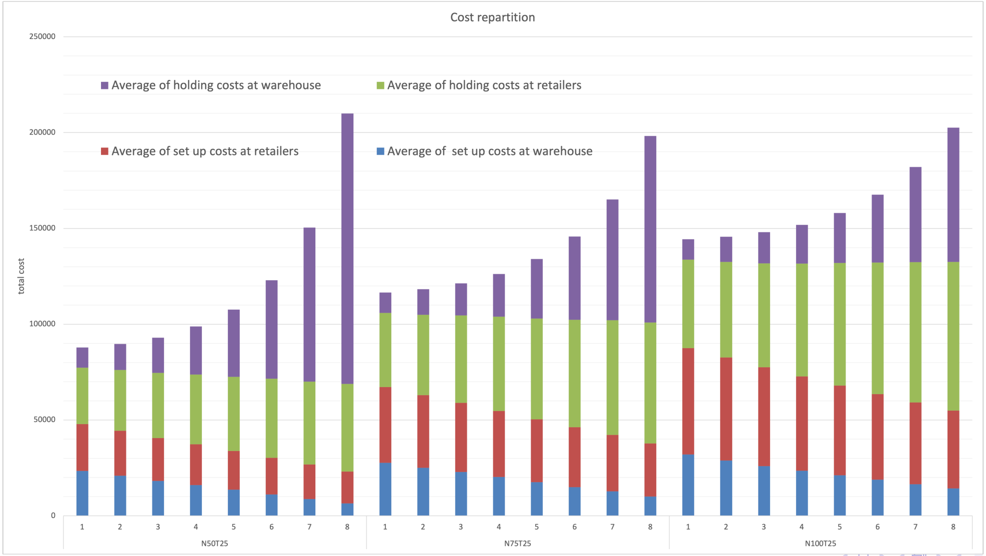
Total max - solving time authorized periods



Total max - relative solving time



Total max - cost repartition - number of removed periods

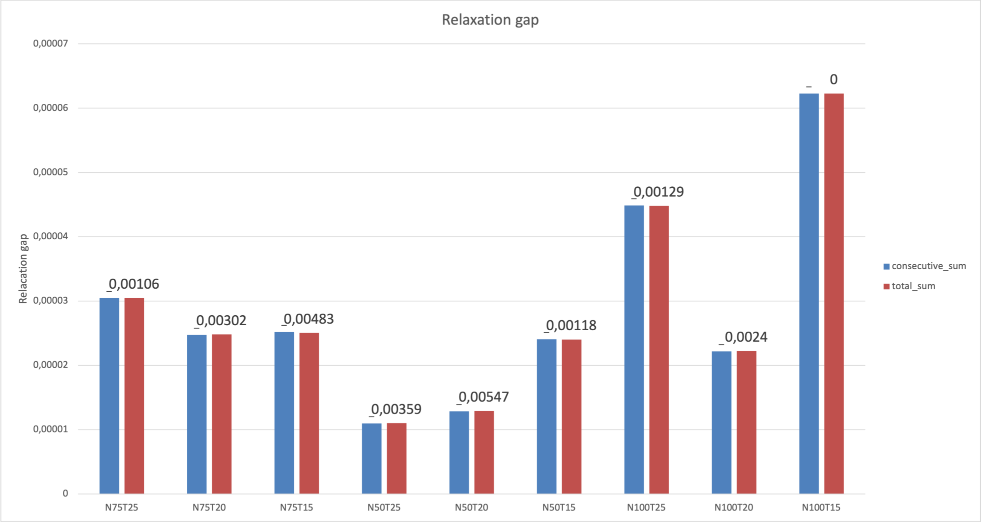


Total max - cost repartition - number of removed periods

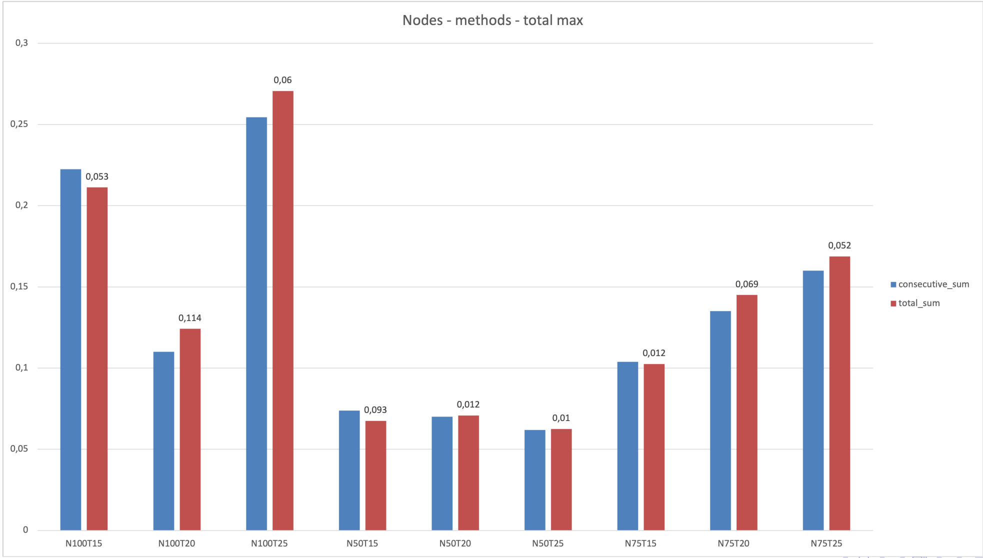
Observations

The holding costs at the warehouse significantly increase.
The number of set-ups at retailer decrease : it adapts to the warehouse

Total max - relaxation gap - tags: relative difference



Total max - nodes - tags: relative difference



Total max

Observations

Do the two methods have the same relaxation?

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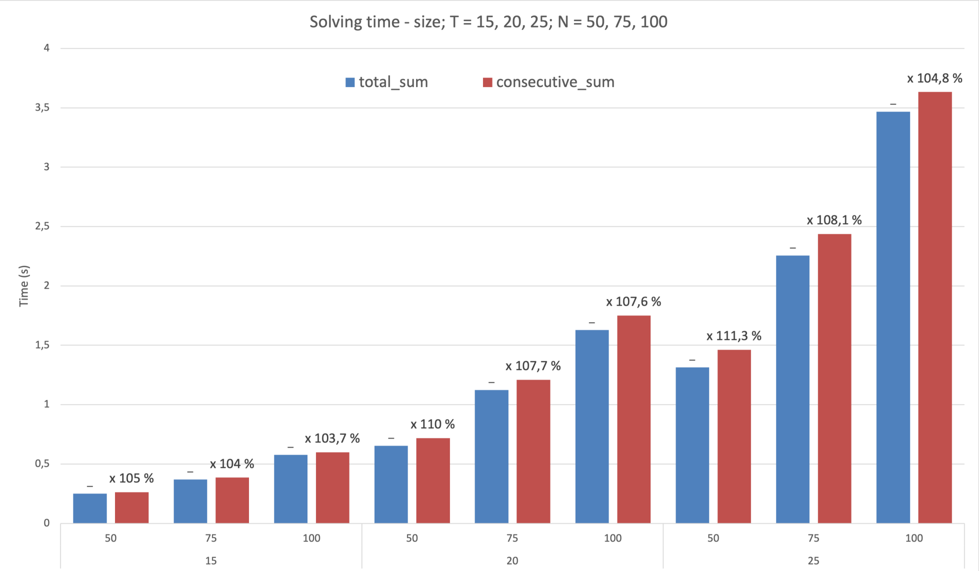
Maximum gap - methods with size - 5 models

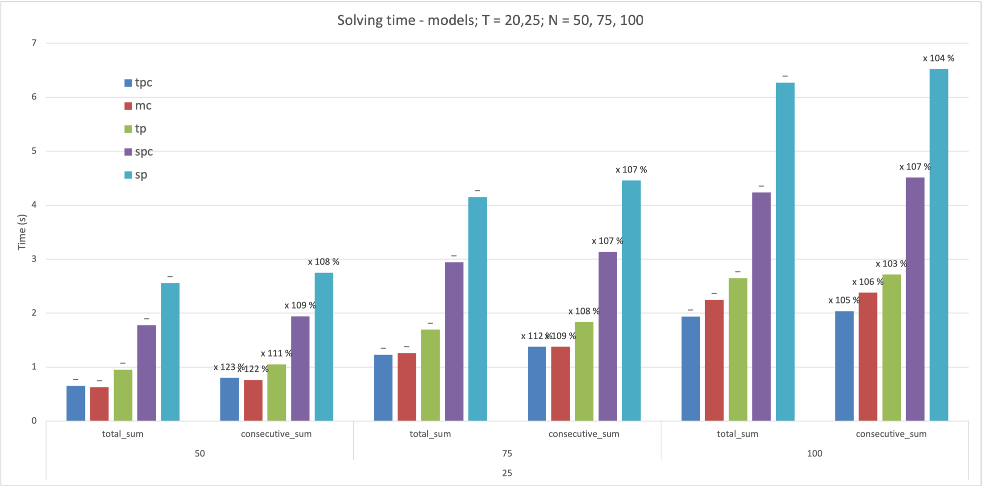


Maximum gap - methods with size

Observations

The total sum method is a little more effective than the consecutive sum method.
Is it really significant?

Maximum gap - methods with models

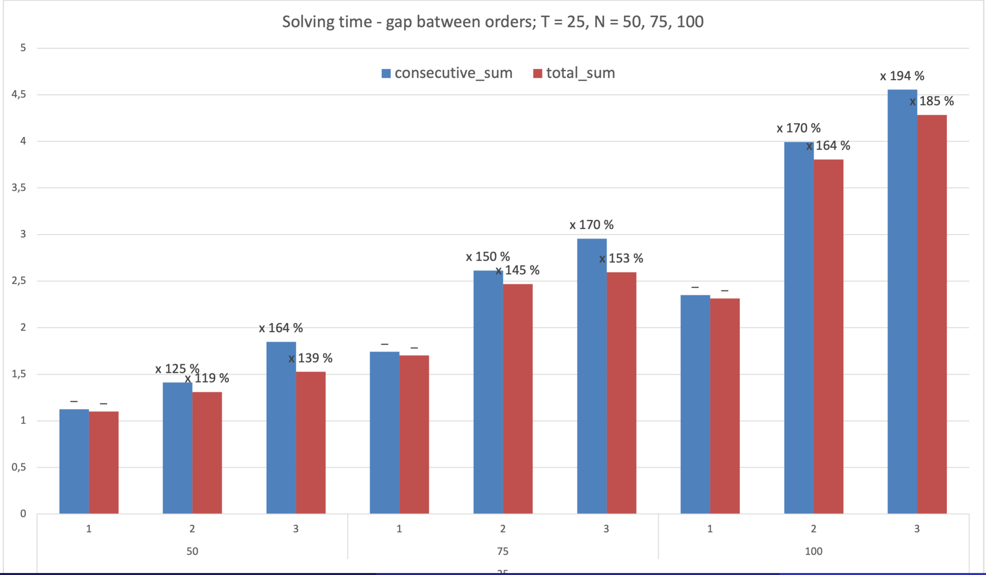


Maximum gap - methods with models

Observations

Is there a model that works very badly with a specific method? Same results on all the models.

Maximum gap - methods with n

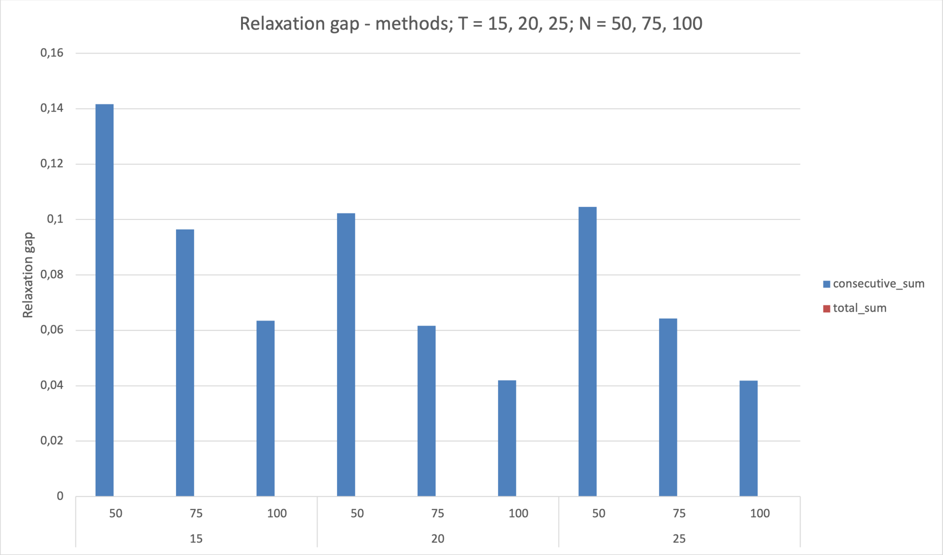


Maximum gap - methods with n

Observations

The consecutive sum method increases a little more as the mandatory gap increases.

Maximum gap - relaxation gap

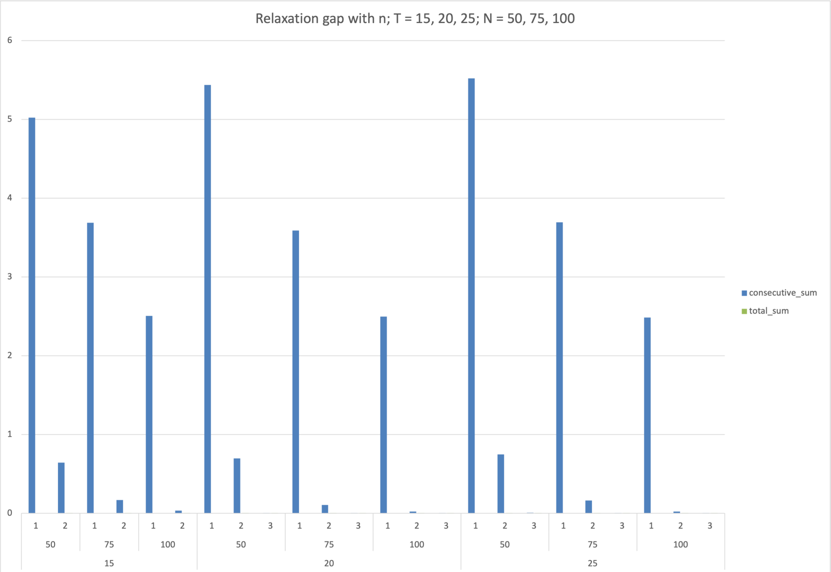


Maximum gap - relaxation gap

Observations

Formal proof that consecutive sum is a worse relaxation?

Maximum gap - relaxation gap and n



Maximum gap - relaxation gap

Observations

Decrease significantly with n

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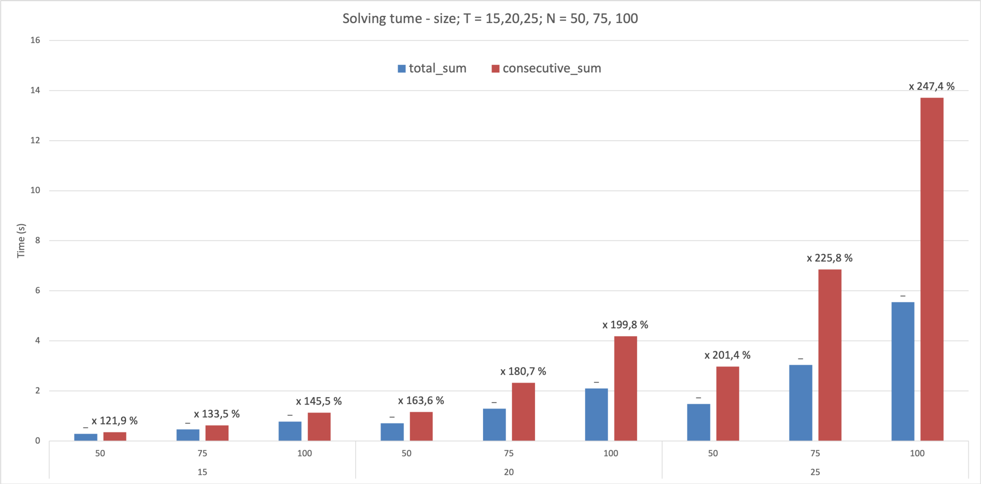
Minimum gap - methods with size

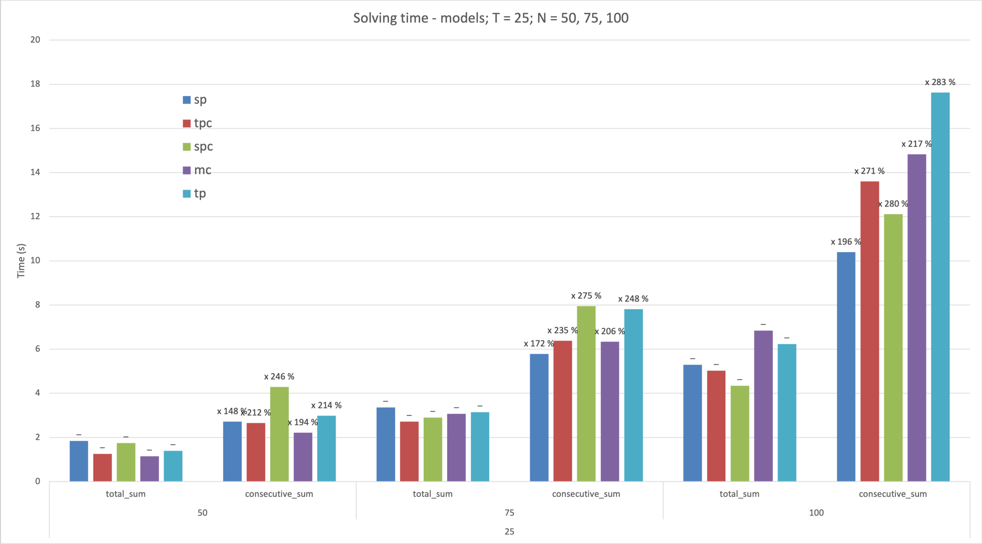


Minimum gap - methods with size

Observations

The total sum method is far more effective than the consecutive sum method

Minimum gap - methods with models

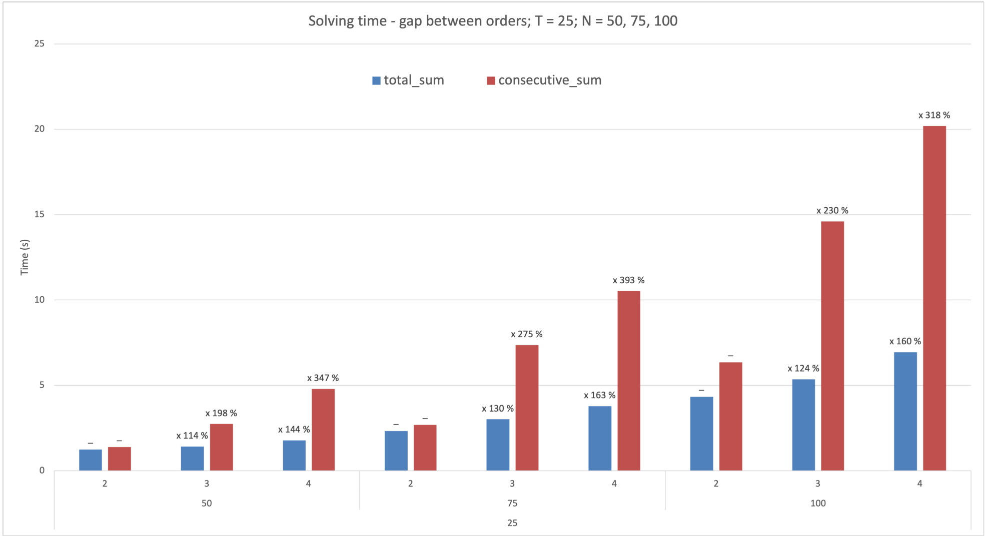


Minimum gap - methods with models

Observations

Is there a model that works very badly/well with a specific method? The MC model losses less efficiency between the two methods.

Minimum gap - methods with n

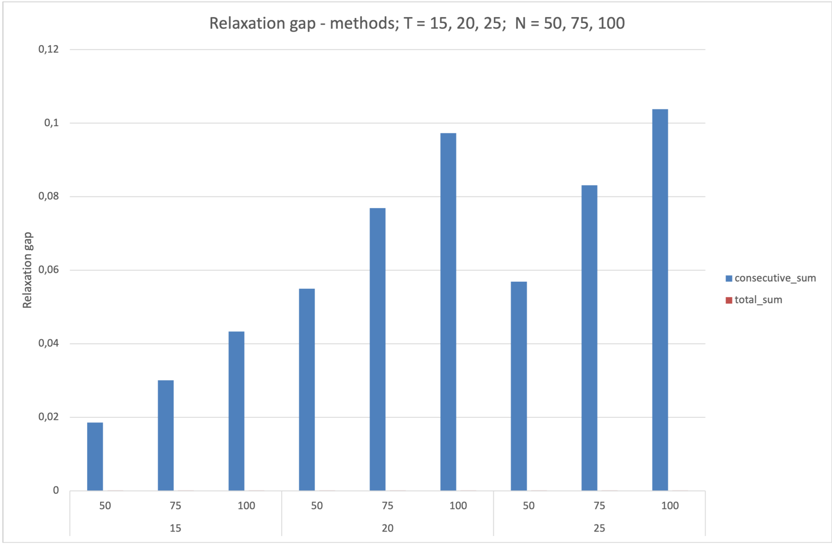


Minimum gap - methods with n

Observations

The consecutive sum method solving time increases far more as the mandatory gap increases.

Minimum gap - relaxation gap

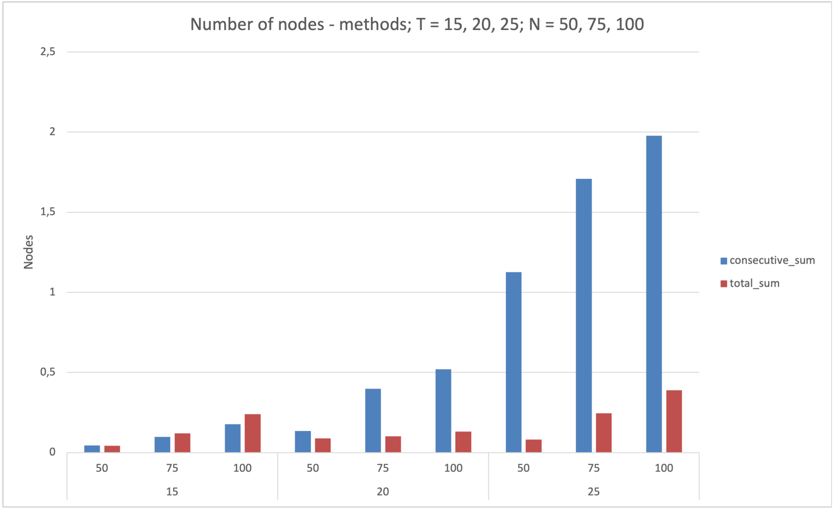


Minimum gap - relaxation gap

Observations

same : proof that gap of consecutive sum larger ?

Minimum gap - nodes



Minimum gap - nodes

Observations

attention to the scale