Talk 18.03.2019

Discovered with the volume that if a load is heavier/bigger than the capacity of a car the Big M in constr. 7 and 10 does not work (value has to be less than 0 when vehicle not visiting. Should we change this or leave it? Leave for now. If it is the case at 4flow that this happends the program will anyways not mind.

Volume constraints seems other than that to work fine in AMPL. The toughest constraints win

Define all indices, also introduce alfa and beta. Done

Try to formulate amount of more specific as numbers of or other.

Amount of weight after visiting node i\* check this for liv and others. - done

When I define B and Z in table try to find a better wording more precise. done

Ci has a problem in same table. Done

Add Ndf instead of just Nf since Nf is a subset of Nd. done

Change A\_v after instroducing the indices before the sets. done

Amount is written wrong in first Set. - done

P\_i is a set of time window indices. And T\_i is timewindows. done

Maximum sounds like we optimized, probably better to use the biggest load on the vehicle. done

Talk 13.03.2019

For tomorrow I have the following:

- Update on programming status

- Solution representation example: [1 2 9 8 0 3 10 0 4 11 0]

Make sure I dont loose any runningtime, possibly do a preprocessing (only one time) to pair nodes if that can solve potential problems.

- Keep A\_v and for each vehicle. And define alfa and beta for each vehicle.

- Attachments input?

- Still missing data from Lars...

- Some private news.

TimePlan: finish by easter and fine-tuning after

20.-25. april ahmad is gone

23.-26. june a conference

29. juli until 02.august holiday

Talk 07.03.2019

Try to keep the objective function quick.. Rather see if I can change the solution representation if neccesary...

Talk 03.03.2019

Q1: Instance generator creates data readable for AMPL right? So far I made the java program able to read AMPL data so that instances can easily be generated and sovled by both models.

Talk 28.02.2019

Changed the constraint we talked about to exclude fixed costs and added the constraint regarding pickup and delivery time. This worked and the model should now be complete.

Had a talk with Lars and we looked at some of the data together. It could be that I need to change the model a bit due to the following points:

- Not just weight but also volume is relevant for loading. Might need another constraint to make the model take the volume into account.

- I will get anonymous data to use for quite a large instance. I can play with this data however I want.

- Also the origin and destination might also be a problem regarding the data that we do not take into account.

- Some data are incomplete. Time windows and factory stop limits are definetly missing and we will have to generate this our selves.

- Might be other problems coming up when I have studied the data further.

Q1: Thought that I would keep the model as it is now and continue writing the paper as it is. Might be several problems regarding the data, and I find it a bit unprofessional that Lars seem to have a new constraint every time I talk with him. So I will rather deal with whatever adaptations he wants later and continue working for now. Do you find this reasonable? Only add this if I can do it without too much work and nothing more.

Q2: How should I generate the missing data? Should I just make up some data that is reasonable and where a good solution should be possible? Try to vary it but not too constrained.

Q3: Data that I generate might then be a bit similar (lots of equal time-windows etc.) is this a problem? Dont waste too much time on the data. Just check how the real data varies and generate data based on the real instance. So dont solve his now just use it to generate my instances and to make an illustration of the problem and use this to describe the problem and solution in the paper.

Take a sample of my problem and illustrate it on a map of germany and use this in the solve and present a solution of the problem.

Make a program to generate instances and use ampl to solve it. Gradually increase the instances until AMPL doesnt work anymore. Make vehicle types and make the program able to select different properties to the data.

Talk 21.02.2019

Q: Time windows are getting bound upwards (always choosing last time window if possible. Dont understand why (isnt AMPL trying to lower the variables?). Not really a problem for solution but could be a problem later when I have bigger routes and want to present solutions. It would look better if they were bound downwards so that I would end up with the fastest solution instead of the slowest possible. Also even though travel from last node til destination node is free it sets the time at final node to upper timewindow at final node. Solve this by running another model with only arrival time as variable, if it is important

Fixed costs are always included since my model always choose an interval for weight/distance inspite it being 0. Should probably do something about that, especially if I want to have too many cars in my instances, which should lead to some cars being idle and my model will then still include the costs for these cars. Solve this by changing constraint no 21 equal to left had side of constraint no. 4. Check constraint 18-21 that they are still valid.

Fix Time constraint, no. 11 from Hemmati et al. Needs to be there to ensure subsequent delivery

Talk 14.02.2019

- Have to make sure that the cost in the maximum weight dimention is increasing if not the model will just ajust l\_max upwards as long as everything else stays the same. Should however not be cheaper to send something heavier (other costs will be more expensive).

- Add high costs/distance/time on going to starting point and from finish. done

- remove all constraints and solve problem with limits on variables

- add one by one and finally remove limits

- model: start with calculating the objective function, and solution representation

- then move on to feasibility and check against AMPL results

- Then build model and see if I get the same solutions.

Talk Ahmad 31.01.2019

* Change the fix parameter - done
* make o(v) and d(v) parameters - done
* waiting time at node i and maximum weight in v - done
* What is n in 2n - done
* what is the alpha and beta in the set A - done
* make it clear what is the difference between Pi and Ti - done
* change the variables b and d sets descriptions - done
* Work on defining the nodes as they sometimes share locations and use that to explain L and S etc. Define S before Ls – done, though need to describe better
* Add the remaining variables at the end of the constraints and try to minimize them - done
* If I can add a similar constraint as 21 and use the same b
* Next steps: improve writing and start programming.
* If it is super difficult to use the solution representation from the course, change it but try to leave it minimize it. Write one sample and try to find the objective value and see if its enough.
* Give one solution to AMPL with a small sample and check that AMPL gets it right. Make a small solution by hand and use this for everything, also programming later.

February 11 Monday is cancelled.

Q&A 17.01.2019

Question for Lars: Do we have different costs per leg? Or is it purely per km/kg? My presumtion only per km.

Changes to make:

Cost structure and paper: Make it clear that we have the responsibility to plan the travels with which vehicles etc.

Q&A Lars 22.01.2019

For Ahmad: How do we want to use/publicise the instances?

There is not really different costs per leg but there is a possibility to expand the model to take into account the start and goal location. The cost structure can be different starting from one region to another. Lars says its also ok if we rather adapt the heuristics later to this part.

It also might be that sometimes you have costs per stop (which means that since we are travelling from i to j and not from supplier to factory) that we are not able to count it with xij (unless we somehow say that costs from i to j within a supplier/factory is 0). Lets discuss how to handle this.

These are both things that we dont have to handle but are more nice to haves that I could adapt the heuristic model for 4flow rather.

24.01.2019

We need to say we have 4 vehicles, 10 stops, bla bla but nothing more.

Need one instance, realistic,

we will not make the instance public, we are not going to write about the customers. We write general about the instance, number of request, number of vehicles, etc. To show how small or big is the problem. To illustrate the problem its nice to have a map with locations, but it doesnt have to be a real example, its completely fine if its fiction but ofcourse the closer to a «real» problem the better for the model.

Many interesting problems, would you be willing to define a good comprehensive model for a phd who will start in 3 months for 4 years.

Preben: Think about the problem if we open a facility we have a fixed cost, if not we dont have it. 5 binary variables, sum equal to one, determines

sum of (j \* xo(v)j) will give me a j which I can multiply with only parameters to determine which cost structure I should use i.e which location I start from.

If our visit in a factory is visited our variable

Focus on point 1 & 2 question, on the weekend and see if we need to adapt alot..

28.01.2019

T1: Adding weight and fixed costs to the model. Should work. Change to greater than instead of max..

T2: Taking starting location into account.

What about all the extreme cases here? If you go from the middle, first north then south. If it is simple and you can only start from cologne or berlin og munich and its always simple then it doesnt make sense for the mathematical model. Then we will work on this later rather as it requires some special knowledge of the geography of the company. Need to ask Lars what all the edge cases are and how it should work for a general case.

T3: Adding stop costs to the model.

Should work.. need to change to Ci and Cj to make the model more general. Write it in the pdf and send to ahmad.

Questions for Ahmad:

* Why do we have to add half the costs? Cant we say that we add all costs after a stop? So an example o(v) ->C=0 i -> C=10 j -> C=10 k -> C=10 d() C(total) = 30
* Very interested in working together about a project. He will bring the topic around the house and make a list of problems in Optimization direction and then let you know about a meeting. I will send you both an email to start your thread and either he or someone else will be the contact person.