Audio file

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Transcript

00:01:13 Kirill

hello hi Professor good morning good morning can you hear me yeah can you hear me yes what's up yeah so uh just quick uh thing so just to recap the meeting and I wanted to uh show you my approach I want you to you know tell me good bad right so first of all uh I showed them yesterday my uh

00:01:40 Kirill

like the proposal, they are mostly happy with it, very, very happy, apparently.

00:01:48 Kirill

They do expect me to make it state level.

00:01:52 Kirill

And they do expect me to try at least to leave the like the output of the program to be ready to be mapped directly into either Google Maps or Mapbox.

00:02:03 Kirill

So that's like their intent.

00:02:05 Kirill

And they also

00:02:07 Kirill

expected to implement it right away when I finish this project.

00:02:14 Kirill

So, but they accepted the thing that I'm not going to be developing for their system in particular, right?

00:02:20 Kirill

So I'm developing the algorithm first and foremost, and they'll later be able to adapt to their system.

00:02:28 Fabio Miranda

All right.

00:02:29 Kirill

Right.

00:02:30 Kirill

Then I wanted to

00:02:33 Kirill

show you quickly what's my approach just to know whether I'm on track, right?

00:02:39 Kirill

Like a good track.

00:02:41 Kirill

So what they want is, as you know, is for given if I'm like at any point in this route to be able to know if there's a storm, for example, right coming to be able to avoid it, right?

00:02:55 Kirill

So my current approach, after talking with Vamsi and thinking about it myself,

00:03:01 Kirill

I decided to do it this way.

00:03:02 Kirill

So we have, for example, this a map of Chicago, and each of these areas right is these are areas that I can reach driving right in 15 min increments, right?

00:03:18 Kirill

So I can reach all of this area in 15 min.

00:03:20 Kirill

I can reach all of this area in half an hour, this area in 45 min, right?

00:03:27 Kirill

My idea was that I load a different

00:03:32 Kirill

weather like data point for each of these routes.

00:03:39 Kirill

Right.

00:03:39 Kirill

So for example, for this 15 minute one, right, I'll load the one that you're seeing on screen, right?

00:03:45 Kirill

So this like blueish tints represent a millimeter rain.

00:03:53 Kirill

rain over the city.

00:03:54 Kirill

So this is for only this 15 minute part, right?

00:03:57 Kirill

For example, for this, from 50 minutes to 30 minutes, I'll load the next set of data that I have, which I then I couldn't graph here, for example, right?

00:04:07 Kirill

So on.

00:04:08 Kirill

So I do approach a problem here, which is that to be able to calculate this thing, oh, well, yeah.

00:04:16 Kirill

And once I have like all these like segments of rain combined, right, I have a new data set.

00:04:22 Kirill

which stitches, you know, multiple rain data sets.

00:04:27 Kirill

And from that, I can just create the weights for my graph and just, you know, and just distract to find the, like, while minimizing the weights, right?

00:04:39 Kirill

So found the round while minimizing the rain.

00:04:43 Fabio Miranda

So what's the, what, what did this yellow, orange?

00:04:47 Kirill

Yeah.

00:04:49 Kirill

Yeah, so this is just the limitation area of what they can reach in 15-minute driving.

00:04:54 Fabio Miranda

But why do you have that?

00:04:56 Kirill

Because I have the where data is in 15-minute increments.

00:05:01 Fabio Miranda

So you're going every 15 minutes, you're going to run the routing again, considering a new set of weights for the routing.

00:05:14 Kirill

I thought of that first, but no.

00:05:16 Kirill

What I do at the beginning is just calculate these 15-minute parts, right?

00:05:21 Kirill

Then I load the rain data sets for each one of these.

00:05:26 Kirill

Then I create the weights for the graph.

00:05:29 Kirill

And then at the end, already having calculated all the weights, I make the decision for the routing.

00:05:38 Fabio Miranda

But I don't, so but where is the 15-minute coming into?

00:05:43 Kirill

So because the data that I have, it is in 15 minutes agreements, right?

00:05:51 Kirill

So for example, what I'm using here, it's time 18 of the data set that I have.

00:05:57 Kirill

So from a day, from the 12-hour period that I have, right?

00:06:01 Kirill

I'm using time number 18, which is the one you see like map.

00:06:05 Kirill

So this be time 18, this be time 19, like all of this within the orange.

00:06:11 Kirill

but not on the yellow.

00:06:12 Kirill

And then this time 20.

00:06:14 Fabio Miranda

So the 15 minute increments are only for merging the rainfall data with the with the street network.

00:06:27 Kirill

Yes.

00:06:29 Fabio Miranda

Okay.

00:06:29 Fabio Miranda

So all right.

00:06:40 Fabio Miranda

And but

00:06:42 Fabio Miranda

the rainfall data that we see there is just for one specific time, right?

00:06:47 Kirill

Yeah, in this particular, this blue-ish things are just for one particular time.

00:06:56 Kirill

I couldn't find a way to stitch them together into a graph, right?

00:07:00 Kirill

So it does it for the algorithm, but it doesn't do it for the graphs.

00:07:06 Fabio Miranda

Okay, so every 15 minutes,

00:07:10 Fabio Miranda

you're going to consider different weights for the graph.

00:07:17 Fabio Miranda

I'm sorry, subgraphs will consider different weights, right?

00:07:21 Kirill

Yeah, based on the data, like on their patch of rain data available, right?

00:07:27 Kirill

So if there's no rain, for example, here, there will be almost no affectation to the weight.

00:07:34 Fabio Miranda

So is this really necessary?

00:07:36 Fabio Miranda

Because

00:07:37 Fabio Miranda

you know, irrespective of this, you will still need to change the routing every so many minutes, right?

00:07:50 Fabio Miranda

I mean, is this ready?

00:07:52 Fabio Miranda

So is the merging between these slices of rain with the street network ready?

00:08:00 Kirill

Yeah, it is.

00:08:01 Fabio Miranda

And if it's ready, then fine.

00:08:04 Kirill

I do have a couple of problems.

00:08:06 Kirill

I don't know how to address them in particular.

00:08:08 Kirill

So one of them is just of optimization because I have to run distra for this part, then distra for the second part and for the third part, then for the fourth, right?

00:08:18 Kirill

Only in the city, for example, on my laptop to calculate a route between, for example, these two points, it takes over a minute.

00:08:25 Fabio Miranda

But you have two things.

00:08:26 Fabio Miranda

So computing the route takes a minute, right?

00:08:29 Fabio Miranda

But the route is irrespective of this partition that you did, right?

00:08:34 Fabio Miranda

The routing only cares about the street network and the weights, right?

00:08:41 Fabio Miranda

And the weights were defined by this 15 minute, you know, range.

00:08:45 Kirill

Yeah, for the, yeah, yeah.

00:08:47 Kirill

But I have to do this for every trip because if, for example, if I step from here,

00:08:53 Kirill

Right.

00:08:54 Kirill

It will be different.

00:08:55 Kirill

The area in which I can reach in 15 minutes will be different.

00:08:58 Fabio Miranda

I know, but, okay, but, you know, well, that's why, you know, maybe don't consider this.

00:09:08 Fabio Miranda

This is too fine grained and too, you know, just consider the one time step, merge the graph with the rainfall and then compute the route.

00:09:20 Fabio Miranda

I think, splitting this into this subgraph, sub spaces will, make things more problematic than it should be.

00:09:37 Kirill

Thing is that they want to be able to, so what they have currently is

00:09:42 Kirill

given one timestamp, right?

00:09:43 Kirill

They can overlay their data on the map, right?

00:09:46 Kirill

They do have this operating.

00:09:47 Kirill

I know, but wait.

00:09:49 Fabio Miranda

But, but no, that there's the stuff that we, they want, there's the stuff that we can do, and then there's the stuff that, you know, should be done.

00:09:57 Fabio Miranda

I think, you know, the, the, the, yeah.

00:10:10 Kirill

Yeah.

00:10:12 Fabio Miranda

Oh, please go ahead.

00:10:13 Kirill

No, yeah, I just wanted to show that, for example, for only one timestamp, I already have it working.

00:10:18 Kirill

So this, for example, the blue line is the ideal time, is the shortest line on length, on time, so the facet route.

00:10:26 Kirill

And this is just a very high punishment, like ways-- Based on the rank.

00:10:32 Fabio Miranda

Based on the rank.

00:10:34 Kirill

Yeah.

00:10:35 Fabio Miranda

So I think that the goal should be

00:10:41 Fabio Miranda

not necessarily to have all of these subgraphs and compute, because in the end, this will take time to compute, right?

00:10:51 Fabio Miranda

So the routing takes a minute right now.

00:10:55 Fabio Miranda

If you make all of these partitions and you consider different partitions, I mean, that will take time.

00:11:09 Fabio Miranda

Do you feel confident that you can do it?

00:11:12 Kirill

I had a couple of approaches.

00:11:14 Kirill

So I couldn't have two problems, right?

00:11:16 Kirill

So first of all, it's creating the weight given two or more weights, right?

00:11:22 Kirill

So I may have, for example, length, rainfall, and wind.

00:11:27 Kirill

That is one problem that I still don't know how to exactly approach.

00:11:30 Kirill

I was thinking about entropy-based weighting.

00:11:34 Kirill

Right?

00:11:34 Kirill

I'm researching that.

00:11:36 Fabio Miranda

Keep that.

00:11:37 Fabio Miranda

That's a big problem.

00:11:38 Fabio Miranda

So what would be the other problem?

00:11:40 Fabio Miranda

Is the splitting.

00:11:41 Kirill

Yeah, and the other one would be optimizing the algorithms you can run faster.

00:11:45 Kirill

So for example, for the optimizing, I was thinking on rewriting a couple of things in C++, for example, right?

00:11:52 Fabio Miranda

But wait.

00:11:53 Fabio Miranda

So as of now, how long does it take to do the partitioning and the merging with the graph, considering this case?

00:12:02 Kirill

So for example, here in my Jupyter notebook, which I'm working in, right, which is a bit slower than just running it in Python, right?

00:12:10 Kirill

If I only run the chunk of code that is to calculate the route and like everything, it takes about a minute.

00:12:16 Kirill

If I have to load the graph and then do like load every dataset, it does take a bit longer, but it's because I have to like load everything.

00:12:24 Fabio Miranda

So the routing takes a minute, but what about the whole pipeline?

00:12:28 Fabio Miranda

Partition, loading the graph, partitioning the rainfall in the routing.

00:12:35 Kirill

I think it should be this one.

00:12:36 Kirill

It takes about maybe a minute and a half, maybe two minutes.

00:12:40 Fabio Miranda

Including the partition.

00:12:42 Kirill

Including like loading everything from scratch, transforming all of the data and so on.

00:12:49 Kirill

Yeah, it takes about maybe two minutes.

00:12:51 Kirill

Yeah, if we only talk about

00:12:56 Kirill

calculating the route, right?

00:12:59 Kirill

So calculating the, the rain.

00:13:07 Kirill

This is the graphing.

00:13:08 Kirill

It's, it should be this one, right?

00:13:15 Fabio Miranda

Okay, but no, let's go.

00:13:16 Kirill

So it takes a minute.

00:13:18 Kirill

So this, this alone

00:13:20 Kirill

It only takes a minute.

00:13:21 Fabio Miranda

So, but just to make sure, it takes a minute considering this partitioning that you did, right, of the 15 minutes increment.

00:13:29 Kirill

Yeah, yeah, so it takes a minute to get every, like, to calculate every, like, range that I can reach, to calculate the rain within it, and to calculate the final round.

00:13:40 Kirill

To do everything this, it takes about a minute, just of calculating.

00:13:44 Fabio Miranda

And in between those steps, also the merging with the graph, right?

00:13:50 Kirill

To make the graph like as the visualization, it takes maybe...

00:13:54 Fabio Miranda

No, no, I mean to add the weights to the graph.

00:14:00 Kirill

Oh, yeah, like everything.

00:14:01 Kirill

Yeah, that everything takes me minutes.

00:14:03 Kirill

I mean, if I have a max.

00:14:05 Fabio Miranda

Okay, then that's fine.

00:14:07 Fabio Miranda

You know, since it's already done, that's fine.

00:14:11 Fabio Miranda

I don't think we should try to optimize this.

00:14:14 Fabio Miranda

I think the second problem that you mentioned,

00:14:17 Fabio Miranda

Well, the first problem that you mentioned about the weights, right?

00:14:20 Fabio Miranda

How do we combine weights?

00:14:22 Fabio Miranda

Because we have rain, we have wind, we have temperature, we have the length, right?

00:14:27 Fabio Miranda

How do we come up with a single metric that is able to cover all of these different variables, right?

00:14:37 Fabio Miranda

I think that's more interesting to tackle.

00:14:41 Fabio Miranda

So right now, given two points, can you compute multiple routes?

00:14:47 Kirill

Yeah, yeah.

00:14:49 Kirill

I can.

00:14:51 Kirill

Yeah, I can, for example, make different.

00:14:53 Kirill

So I'm still waiting on, for example, their thresholds above which, for example, if a route has over 10 millimeters per hour of rain, I should just discard that route right?

00:15:05 Kirill

I'm still waiting on that.

00:15:06 Kirill

But I could, for example, could have multiple weights.

00:15:12 Kirill

right?

00:15:13 Kirill

So for example, for multiple routes, if I want to minimize rain, if I wanted to minimize wind, heat exposure, and then I could try to, I think, yeah, it's possible to get, for example, second best route, right?

00:15:28 Fabio Miranda

So I think, so let's go, you know, first, let's have what are the variables that we are looking for, right?

00:15:35 Fabio Miranda

You mentioned maybe for, right, temperature, rain, wind.

00:15:42 Kirill

They told me I should take into...

00:15:45 Kirill

So I didn't understand what they said because they, on one hand, they said that I should only take into account rain.

00:15:51 Kirill

But then at the same time, they told me that usually when rain is heavy, speed decreases on the road.

00:16:00 Kirill

So if I'm already trying to also model...

00:16:05 Kirill

Well, no, not model.

00:16:06 Kirill

I don't know how to...

00:16:08 Kirill

I'd have to ask them how do they expect me to know how much does the traffic slow, right?

00:16:17 Kirill

Because I said that I'm not going to be playing with traffic, right?

00:16:20 Fabio Miranda

But let's focus on four variables.

00:16:22 Fabio Miranda

Let's focus on rain, wind.

00:16:28 Fabio Miranda

What are the other two that we were interested?

00:16:30 Fabio Miranda

Rain, wind.

00:16:31 Kirill

What I wanted to tell you is that they told me that I should only work with rain, even though I have, I think, four or five variables, I have heat index, precipitation, humidity, wind direction, and wind speed, which combines two vectors.

00:16:47 Kirill

So I take this one.

00:16:50 Kirill

And this one is the same, right?

00:16:51 Kirill

So this is in Kelvin, this is in Fahrenheit.

00:16:54 Fabio Miranda

So let's-- well, yes, they're the same.

00:17:02 Kirill

So I have 4 variables, yeah.

00:17:04 Kirill

So heat, precipitation, humidity, and wind.

00:17:07 Fabio Miranda

So, okay, so you have 4 variables.

00:17:12 Fabio Miranda

Let's create 4 cases.

00:17:15 Fabio Miranda

No, one routing that tries to minimize heat, one routing that tries to minimize precipitation, one routing that tries to minimize humidity, one routing that tries to minimize wind.

00:17:28 Fabio Miranda

right?

00:17:29 Fabio Miranda

We see those.

00:17:30 Fabio Miranda

And I think that the challenge that we need to move towards is navigating this space, right?

00:17:38 Fabio Miranda

It's not necessarily focusing too much on the data processing, the routing algorithm is, you know, now that you have multiple alternatives to go from A to B, how do you show that to the user?

00:17:57 Fabio Miranda

I think that is the bulk of the work that we should focus on and not necessarily on the minimization routing aspect.

00:18:07 Fabio Miranda

Makes sense?

00:18:08 Kirill

Okay, yeah, yeah, it does make sense.

00:18:11 Fabio Miranda

We have four variables here, but in between, we also have variables, right?

00:18:16 Fabio Miranda

So I want to allow for the user to set their own

00:18:26 Fabio Miranda

their own requirements, right?

00:18:32 Fabio Miranda

The user wants to minimize wind, but you know, he doesn't care about temperature.

00:18:36 Fabio Miranda

He doesn't care about precipitation.

00:18:39 Fabio Miranda

I know what's the route.

00:18:41 Fabio Miranda

I think this direction is more interesting.

00:18:46 Kirill

Okay.

00:18:47 Fabio Miranda

So let's let's

00:18:52 Fabio Miranda

you know, wrap up the modeling slash algorithm slash routing that I think we have a good grasp on that.

00:19:00 Fabio Miranda

And then the second stage is exactly you have all you have this space of all potential variations of this inputs.

00:19:14 Fabio Miranda

How do we show to the user that?

00:19:17 Kirill

Okay, then

00:19:22 Kirill

Then, for example, the next time we have a meeting with Apnaf and Ashish, I would then really like to have you on to like explain this because they are pushing in one way, you know, to their way.

00:19:33 Kirill

And we're like pushing a bit against, right?

00:19:35 Kirill

So just to have like for one to be on the same page.

00:19:38 Kirill

Yeah, I can try.

00:19:40 Fabio Miranda

I can try.

00:19:41 Fabio Miranda

I can try.

00:19:41 Kirill

It'll probably be either next week or in two weeks.

00:19:44 Kirill

So, but just I'll like tell you next time when we're meeting.

00:19:49 Fabio Miranda

Yeah, sounds good, but no, keep the research hat on, right?

00:19:54 Fabio Miranda

We don't want to just build software for the sake of building software.

00:19:57 Fabio Miranda

We want to tackle something that is hard to tackle, and we are doing that, right?

00:20:03 Fabio Miranda

I'm not discounting the modeling algorithm, and that's hard.

00:20:08 Fabio Miranda

But, you know, once we are done with that, I think the juiciest part of this problem is, you know,

00:20:18 Fabio Miranda

you have this infinite possibilities of mixing all of these variables, right?

00:20:25 Fabio Miranda

How do we allow for the user to choose the different options that they might have?

00:20:33 Fabio Miranda

Okay.

00:20:34 Fabio Miranda

Yeah.

00:20:36 Fabio Miranda

But, you know, this is exciting.

00:20:39 Fabio Miranda

I don't want you to, you know, the routing, the modeling, I thought that it would take much longer, but, you know,

00:20:45 Fabio Miranda

Now that is almost ready, I think we should take the step forward, take the next step, which is let's play with the variables, right?

00:20:54 Fabio Miranda

Let's see how we can combine these different variables.

00:20:58 Fabio Miranda

So maybe one thing that you can do now that you have everything almost ready in terms of modeling, given A and B, you put the weights as being wind.

00:21:14 Fabio Miranda

Or you put the weights as bin temperature, do these routes change?

00:21:22 Fabio Miranda

And you want to minimize those things, right?

00:21:24 Fabio Miranda

Do these routes change?

00:21:27 Fabio Miranda

Do they change by how much?

00:21:30 Fabio Miranda

If we are able to see that through this matplotlib plots that you have, let's talk about that.

00:21:39 Kirill

Okay, yeah, I'll do that.

00:21:41 Kirill

And then, yeah, I'll keep working on like,

00:21:44 Kirill

minimizing the bias for multiple weights, right?

00:21:48 Kirill

I cannot minimize for everything because it's an NP-hard problem, so it's literally possible.

00:21:54 Kirill

So I'll be doing this like entropy wording thing so that the biases for all like the weighted sum to minimize the bias at least, right?

00:22:08 Kirill

And then I'll prepare

00:22:12 Kirill

four of those models because I have to do some calculations, help prepare one for with just two variables, one with three variables, one with the four variables.

00:22:21 Kirill

And now start plotting, start playing and minimizing for each temperature and wind and everything.

00:22:28 Fabio Miranda

And I think the only thing you have to keep in mind is that those models that you have, the routing models that you have, they will be, they need to be accessible

00:22:40 Fabio Miranda

through some sort of interface, right?

00:22:43 Fabio Miranda

So once we are done with the modeling slash routing part, we need to make sure that we are able to support the interface that we are going to build within the scope of this work.

00:22:59 Fabio Miranda

This interface needs to access the routing that we have, the routing model.

00:23:05 Kirill

Yeah.

00:23:06 Kirill

Couldn't tell you something like adapt Curio to this?

00:23:10 Kirill

Because in theory, if I'm able just to show, for example, the map on the front end, just to return the map, so everything happens on the back end, I can use that, like Coolio, to just be able to add selectors, right?

00:23:28 Fabio Miranda

So when do you think you're going to have a good version of this modeling routing part done?

00:23:40 Kirill

I think either, so I think I'll take one or two weeks.

00:23:45 Fabio Miranda

Okay.

00:23:48 Fabio Miranda

Let's then catch up next week.

00:23:51 Fabio Miranda

Once you, let's maybe catch up Monday.

00:23:57 Kirill

Okay.

00:23:57 Fabio Miranda

So that, do you think that Monday you will have at least one or two plots for the routing with the different variables?

00:24:06 Kirill

For the like plotting, for like the running with one variable, it's for me, it's as easy as like my, for me, it's as easy as loading just another data set, right?

00:24:18 Kirill

So I'll load here the rain, the wind, like the, the, the, the, the wind.

00:24:23 Kirill

And for me, it's as easy as when I'm creating the weight to change this.

00:24:31 Kirill

to just make a new function to get the average from the one per one km patch that I have, right?

00:24:39 Kirill

So it's as easy for me as just getting this for rain, for wind, or for temperature, and replacing it here.

00:24:49 Kirill

So for one variable, it takes me essentially 10 minutes to modify.

00:24:54 Fabio Miranda

Okay, so maybe by the end of today, can you send four routes, A to B,

00:25:01 Fabio Miranda

but considering the four different variables.

00:25:04 Kirill

Yeah, and I'll do it with this like rolling like 15 minutes mark thing.

00:25:07 Kirill

Yeah, of course.

00:25:09 Kirill

Yeah, I think, yeah.

00:25:11 Fabio Miranda

And then, you know, send this today and then early next week we can, while you are still doing this, the combination of these variables, we can start thinking and talking about the interface itself.

00:25:29 Fabio Miranda

and whether we are going to use Kurio or not.

00:25:32 Fabio Miranda

And then Gustavo will be back next week, and then we can get him on board on this.

00:25:38 Kirill

Okay, perfect.

00:25:40 Fabio Miranda

Sounds good.

00:25:41 Fabio Miranda

Cool.

00:25:41 Kirill

Yeah.

00:25:42 Fabio Miranda

All right, I'll be online if you need anything, but let me know when those plots are done.

00:25:47 Kirill

Okay, just another question.

00:25:50 Kirill

When's the next GLITS meeting, just in the university?

00:25:58 Kirill

Like biweekly, just because if it's tomorrow, I can like prepare something to present.

00:26:03 Fabio Miranda

Well, you know, tomorrow there is the 11 am meeting, right?

00:26:09 Fabio Miranda

That's everyone.

00:26:10 Fabio Miranda

So feel free to, yeah, please do present that tomorrow at 11 am.

00:26:15 Kirill

Okay, yeah.

00:26:17 Fabio Miranda

So Ashish won't be there, of course, but.

00:26:19 Kirill

Yes, it's like just like within the group.

00:26:22 Kirill

Yeah, okay, great.

00:26:23 Kirill

Perfect.

00:26:24 Fabio Miranda

Sounds great.

00:26:24 Fabio Miranda

All right.

00:26:26 Fabio Miranda

Thank you, Kiru.

00:26:27 Kirill

Great.

00:26:27 Kirill

Thank you, Professor.

00:26:28 Kirill

And as soon as I have everything, I'll send you the plots.

00:26:32 Fabio Miranda

Sounds good.

00:26:33 Fabio Miranda

All right.

00:26:33 Fabio Miranda

Thank you.

00:26:34 Fabio Miranda

Bye.

00:26:34 Kirill

Thanks.

00:26:34 Kirill

Bye.

00:26:35 Kirill

Bye.