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Of his lecture objective in the first lecture, she mentioned that you should remember the objective. Tell us about china is one anyone it has to be done. Two d or three d description in this lecture is different kinds of the education, c extremely. We mainly focus on extremely partial valuable to be your on the three parties online, basically. How do you generate the shape? So you can actually going to different foundation. Because absolutely, there is too many people, The 30. So if you have and that is the research of you take it across the region, you will find it if you rather have it. It's much more challenge. There is a the bigger for us to be images. So why due to the if you study if you have that is the research journey is a lot of that's really so to desire the areas, models, individuals, design application. That is very well.

But what in the next session will introduce some? There is as she might probably. That's the two d many classes. How is it to be information? Possible? Will remarks, but for 3 years. So what's the partner? What's the problem? And why? It's not challenging to design prepare if you want to also, even for the not really is a barriers. It's more challenging from my perspective, the infrastructure or recommendation for three d beta, for three d beta, three beta, two, beta. It's a if you use, that's the most that is a strategy, the part of the match. So a it's different from the two dna what's the biggest project to be a nation? It's just a pretty good. In general, a a a could be a real size and pattern. It's a unify the conditions if you want to pass the data which is possible to delete. It is unified, but australia is a different country.

Next point about the information, send this function as they have. So there's no unify. Which one is good? Which one? Which are you based on his back to it? So the data is a reputation for each others and supplements indications, same section, foundation. So we are very invasive, right? That's a three generation. If you want to design a three block generates three pa which kind of data to generate the right of the dash. Generally the part generally is other kind of the nation, the indirect that you can generate a monthly. They use that 3 ° construction for a lot of you make it to make it that's issue. And there are should not understand. And we ask basic method. So you multiple images are also to the industries. I how's your generated cbd generally ask me satisfied that you can be shut the surface from that is like in the previous years like the generation if you generated. Find out that. Right? So you will find some nasa to generally find out, but the a it's not a good try to refuse it quite about it.

Next, how to model one part, they know the fine part is they know too much. If you want to generate fine part, they can suffer from if the fine part is a huge number, it is huge number of parts. Narrow will be the size will be large. I the number of how of which representation can be is that in china also? So in a product which is different. So first that virtually called a copy of profits and introducing the first election, the purpose is the objectively 1 or 617, right? From the community or city descriptions, I should do the actual information description can be the the treaty, same syria competition nowadays, and you may have any possible to do the tax, right? You can use the tax in english.

But for traditional computer markets, the first step, I think it is the first connections as a modeling. Where do you have? So the first episode model, how to do the model, how to do the model is if we have a model as far as we can attribute of the capture of education and understanding. So this is the first time for model for the traditional the president. But for like the ibr you may face the burden. We can speak as a model. They also the a generation text to image. You can also see the model. Here is about additional, this is we can use it. These different customer, actually, the first task, the first one is you need your question like how the computer draw a line or draw a circle.

Actually, is that is, in addition class, is it possible? So you find out several recommendation, higher match loss and the 7 meter surface. In this surveys, really, it is asking scientist is a company is a it is much like other issue, partial cometric surveys to watch the csp exactly. So the requirement to requirement for is that the concept, these different occasions. So the advantage education. So if you want to study the geometry asked, we have to study with the learn more about it. Is the first part. The first class can enjoy it. So actually the enjoy is so for the image, ii think you have most of you have the image pass, so the cost image.

So for what's the data structure you need, you may is atv a it's a basic unit picture. Picture is a set of clients as uniform issue. It is to be great. The picture that's the same. Like this is maybe one problem. It can be three image of color image for color image. There are three channels. The rap for you through okrgd the primary cost as a primary economy is the primary color revenue for the ukraine, set different values. The two d drawing that give a line, i'll give a circle.

It's a continuous, right? It's a continuous group. But for the compliment is just a literacy. Actually, this process is a discrete condition. Given a line or given a circle, if you want to enjoy itself, enjoy this line. Actually, the colors in the line mission. This is that education. So that's a proper education approximation. A is in addition parts, is that discrete additional to select the pictures? The pictures are probably similar to the minimum approximation area. Ok so this is five questions. The first that we want to draw a line. So this is a line issue. This is a line issue that chooses starting finance. And the process x one, y one. Why this is deciding at the time, this is the line we have is slow. See, the intercept, right? It's a possible with the y axis so that people want to do a lot. If you have this one patient, how do you want to do that? Also, if you want to draw that, you only consider this region. We only consider this region.

But this week, how about you want to join another other region? Other? So how do you? We only consider the region that is the slope in the range from 0 to 1. They are, on this hand, we can reach from 0 °, 45. But if you want the choice, align with this is other chain or other. You have to reject swap. This is the the axis situation. You just what the language for this reason, you have to choose the science exhibition. We only consider the regional from 0 to 25. If you want to align other regions. It just runs up two dimensional changes on it, ok so based on the paper on the symmetry part, they don't see it. Here is the algorithm, actually quite simple. The algorithm is quite simple. Let's say this is the line mission. That's all this is the starting part.

This is the starting part. Now here is one graph will refer to my picture. The black dog refer to the, the black dog will replace the center of the picture in the central location. And so this is starting .. We share with them. A it's a typical color, if we should. This is the red line to the line we want to approximately. Here this is starting fire to share with the red color.

Okay? Then the next step, we increase exhibition by one. We increase exhibition by one, so this is red part, ok so this red point were taken on the line. And so here you can observe this web, find the liquidity between the two pictures. Right? The problem is which picture is left to approximate the system. That is what we have to justify this time. We close it to the other time. Picture of the looks, right? So we can tackle it in the distance that kind of the distance. This is a set of applications, is that no addiction, we can calculate the the distance is the d one and d two, then compare which one is larger. If the d two is smaller than d one. So we should select the location, right? So if you got it, do you want? That means the graph finding ability. In the lower case, the lower picture. If you repeat this, we will repeat this process, increase exponentially, progressively.

And here that as defined as trade, this is a this is happening, actually, is a discrete technician process given online given in this. We will select the picture of the discrete picture, approximate line with the minimum approximation. And then on that, this is the average precision and procedure. So that is to define the line, the fire, located online. Those are the other picture of our lunch. This algorithm. But in computer, in graphics, in gpu how to implement this algorithm like the area, the procedure by simple, if you use a code, the same touch or other program to write this, implement this algorithm is quite simple, right?

But the problem is in the gpu how do we implement this with higher patients implement the average patient? Ok this is an algorithm developed by ibm map, actually. So 6 years ago, and even nowadays in the new part is huge ransis code. Yeah. You run this out with them. Here, this algorithm is aa very efficient. It only use an integers mapping. The efficiency is very high. We only use the integers. How is that you are interested for programming?

Now? This time a this is a line. Yeah, gpu for most gpu class during this, enjoy that. Also similar for, sorry, to draw, other shape is similar to draw.

Then that if you want to just so if you want to do yourself a given a circle creation, here this is a circulation, right? So that is the several points. The bias, we will fix the distance to the center. I see whether I see when I see the center of the circle are in the reading system. And so that is, so we want to find a path to the picture with. So this picture producing this picture produced the minimum proximity. And yeah, so we only draw this region. So we only find the pictures. We only find the picture of this region of other regions. You can be the same issue model. The lattice really, just as well as that. It's a symmetry with each type is.

So for this region, you just change the sign. This is a picture just giving the science that this one a this is a how the computer from the seven and how the market is. So I was still, are you ready to be implemented in the gpu it's very efficient. The next one is the region three. We need to be in the glass. We have a this is out of the evening partners for the maybe kind of a logical algorithm in my life and a a that's the purpose, the purpose a a this is a given aaa region, it's bombing by the there's a lot is here pictures. The picture is black color is the bottom picture if you want to feel the reason.

A typical comment. We got a few of the pictures, because this is the a with a typical time. Here, we can use a recursive. We can design an algorithm. We can design algorithm if you do this reaching recursive. And the idea is also not like the idea is not sometimes it's too far. So the first step, we can select a city, which we call the picture, the picture we call the same picture. So first, that one pixel travel rather than pictures within the region, is that the picture with this region? And also we just buy the color. This is simply equal to the product pictures. He said the product picture is not then if you share this picture, the specify in this example that we have, it's a free power.

There is the next episode.

After shading this picture with a free power, then we will select them. The neighbors is up and down left, right? The four neighbors and the city picture I and check the column. Is it equal to that a as a column of product picture? Or if not, should be the specific column and repeated this process recursive that and this regime is due to.

So so that's, in this example. We can feel so that the initial this region will feel dot com. It doesn't so here, so there are three separated regions, okay? Here, if you select the city picture here and only this original group. So how about this? This to me, if I want us to do this, to read it, how how to handle that? I also feel all the secondary. Here. You can observe the algorithm. It costs the problem, right? I should. Is this example. I only use the repressive philosophy with the four directions. That is the four neighbors up on that, right? In the tuning array, in the picture. Give us a picture, a typical pictures. So it has eight difference, right? So up and down, top left, top right. What do we have? What do we do? Right? So we can use more directions. Here is that beta direction, if you start beta directions, ok the algorithm will across the border and a few other regions and in separate relations.

And so this is the region feeling in. Yeah, so this is what's the right process. So for this part is only to the to enjoy it to the graphics. And nowadays we doing it. Do you know if I just for that how the country have to? We generally to be shares. So we mainly focus on our studio. We mainly focus on three d reference. For the three d reference is the first one, also to the the raw record is a raw data is required a 3 point out.

For 3 . 9, the name suggests, he said, it's a set of parts. It's a set of my own structure and set of points. Here, if you that feeling is a good body, so we were looking behavior of observing the case, perhaps is composed of box, right? The composed of box. Each file is defined by the geometry. Information is sweeping location. Extremely good patients study coordinate is advertising. So the five may be associated with the attribute. What absolutely actually relaxed policy. So in this example, there is no attribute information, only a set of geometry trial defined by the city quality. But for this example, so each part is associated with the color rgb right? Should be harder also to be associated with the abnormal information. Normal information is also three permission. It is the direction the normal information is important in the doctrine of whether a little class.

That's what the real thing we have to calculate. The three category reflection that in brussels. Actually, the factory reaction and here is actually factory reaction at these are normal. The novels is that is in part, this is a 3 . 5, this is 3 . 5 you just set up. I'll try to set up on tv industry scandals ok the scandal devices just scandal. The real world is setting 17 years surface. The scan. It's just a sample device. If the samples and points over the surface, then you build up in this way next in the new year. But if you use the software like the street maps, the photoshop or others, the model is generally informal, final match.

Now for the final match, if the model is captured in the real world, the part of that in the first lecture are interested in service rate functional, the surface being constructed in the app to the original data after scanning. A seven is 3 points. There's no surface. But if you use the shop and if you use a software, you with a lot of manager, yeah, so you come up to the surface better. So here this is a different kinds of standard devices. Excellent. That's all you should make. So here you have, although there are hundred cameras, there are hundred cameras, is it survive the multi view as a sterile vision? So if you want to ask me the distance resolution, the two cameras, you can use a two categories of panels and the big lines about human life.

So knowing that intrinsic and extrinsic, private kinds of cameras know that he is not are based on the occasion, you can pack the distance right here. You use a bottle of cameras. We can achieve the three d the only three d way construction, the way we can find it. But you can also have the major standard, also. This is a structure line, the structure line by introducing the last lecture, the structure and the last period. We calculate the distance so that the project and this is kind of so the project as a new project for the tax, this is an ipad. Is the line happens to the line will be it is hard. And we do the kind of these photos. The texts are nine. It takes a distortion to the equation and tack tackling the cost. It is a project ok so this is the nowadays a a a it's a rather activity in a easily of the australian.

Yeah. But bring a year last ten ten years ago, he said he wants to, he was scanning as it was scanned. I guess that is not using that. The scanners are very expensive. Also, this is a the 3 point of data, the 3 point of whether you are not strike the lighter for that. But for some other numbers driving, let's pass that into the vision case. It's a purely the pure meaning based only use a candle, no lighter, right? No matter, but for many are not studying 100 years life without it will capture them. But in this example, so here this is the license. This a is a real standard real world cup in several times. So this is a fine cup for the lighter a is similar to the reader. It's similar to the reader. But the difference is for the reader is if they use the radio wave, use the radio wave, but for libor is an average is a infrared. If you for a lab, it will vary how long it takes to contact after painting the object ok so for the lighter, so the infer left and the infer left, it hit the object.

So that will be reflected.

And maybe we'll marry the how long it take after he is an object based on the time that we can calculate in business. We can calculate the distance. So is a where we can use the license is there is a to marry the distance. So a so this is the license. You scan. Do you scan the new law? Also a that is so here we can capture. But what from the object action, the vehicle detection and connection detection compared with rgv camera compared with rgv camera. The latest rgv company is a dark environment in the dark environment, the rgv camera, maybe there will be the benefits is relatively low, right?

So that it takes up. And the capture average will be crazy. But for the license, it narrow the distance. Yeah, it's a narrow distance. And then even in the dark environment, it I still work that. So this is the one. This is the . of their instruction capacity. The data from the question, just a sample part. This is a bond requires you can share a real time application. You have to use the scanning devices, although there will connect with your platform. So that is connected with information. Is this? So this is the compared with the part of the match. The little way is the part of the match. So the parts are connected. The clients are connected. So the connected information will be followed face. It will probably, but 5 times just a several district points ok also, it is suitable for real time applications. But the disadvantage that this one is a difficult to perform the geometry computation, because it's a discrepancy.

And for part of the match is a continuous service that is important. Find that shows the possible of the service. It's not as a drastic display over the surface we see, but over the it's very fine that is physical. The competition will be more challenge, will be more challenge.

Also, you have it is some actually, I wish is a learning case of what kind of popular classes.

So here is one of the patients. A it's a the process is a fine copy that you can use a very basic and you'll keep running. That's real. If you find that from the client, right? Find that pass that any problem production in the etc right? So you will find the it's difficult to process them a find out with a larger number.

If you conduct the experiment, you all in the one container, a lot with one son, two sons of one son. But if you want to process the model, you should ten k this is one number of times. So you will find the that is a memory consuming. So that if you use it, but I don't know that can be the transformer or dynamic graph where we using it processing. Ten k plus. So the dp number, 65, it is difficult. So here why? Because the final part is to, but if you process the he made it like you and you maybe 1,000 × 1,000.

All right? So there is a number of pictures itself. You can take the one picture at one point, right? One picture at one point. So the total number of pictures there, ten to the power of six, right? But why is it? They can process them. The limitation, even though we have a solution, it's easy. Not that. But when information is a just a number, just not. Anyone know if you use the process is the give me the data. We can find the education of education even you may be kind of but if I give you a template aa find probably the 78 points, actually that if you found an image is the truth is that's just 100 and the network we use the also.

But you have been used as the models. The fundamental reason is you just part the for images if you want to cover that could be the pollution of neural network, right? Evolution of neural network. So we will regain local information so that you get the current size 3 times 3, the local information will be really, is a really combination of picture value, right? So you will know the neighbors of the center picture. Is it? How do you find the neighbors? You just modify the picture card, right? That is they like to give this is a community. So one block is referred to. One is that in this picture, I want to find a neighbor, right? So here is a little party, right? We can easily find the neighbor right in this picture. That advice is just a modifier, because that is a part of this. I am just possible - 1. If you find the papers right, you find out all the time.

They just as several points in this case, how to find the neighbors? Yeah, it's just a seven even in the two districts. Irrelevant, rather not so for you to image is a distributed rapidly. So here I just figured this to the points, two districts. How do you find the labels? That's it? We want to consider this fine ok so over among these parts to find the neighbors that is closer to this part, you have to calculate the distance part, use appearance such as kidney, as a neighbor, right? Kidney as a neighbor, you calculate the distance, calculate the distance with respect all part one, and select the that's how fast noise, the distance, right?

So we can find five pictures, right? So at 5 points, right? So this searching process, even we can reduce the capacity to closer to meaning, yeah. But in a learning part of these new kind of consumers, because you have to pay the net for infrastructure in many time.

Also even search the neighbors over aa higher product with a huge amount of parts. This kind of thing that could give up finding one to search the neighbors. So one part that's we have 100 million parts. It's a searching process. It depends on single.

And also during searching process, you have to stop manage immediately. You have to stop manage immediately, at least you have to start a distance, right? You can feel consume the matter. It will consider the matter you have to start up in the media. Right? So this is the one reason why the the process of time consuming and the battery consuming, because there is no regular structure. It's different from the images, the pictures distributed the whole relevant agreement. We had a structure for this, no structure. There's no structure. This is a regular structure. Ok so just modify the the body has a card is possible manner. You will find them. So this is a one conference. That's why I introduce this one. We call the structure. Should you find out the recommendation? Put the bias, put it by our group? The I I tried the structure. We have a a series of papers, because fashion. So the basic idea is, so we can recommend we organize if we can reorganize the final part as a two image.

In other words, is to assign auv a two d coordinate, a two d the basic idea intuitively is given us three models. This is three models, ok here we want to put the parts into the picture frame in the picture. How do we organize the picture as at one point and one picture. Here, this is argb three channel, right? Rgb three channels for point out the coordinate is still exercising. I exercise it as argb three channel, one division excavation. One channel is the right? The third channel, is it intuitive? Is how to put the price to the picture? Yeah. So you can readily put the price as a picture. In the end for the organizer, will you please, if you start to find out that we just thought ok as a two d agree that two da reason, for example, the final problem has parts. N points and three dimensions will follow n times three treaty on the grass.

So each group is a x 157, x 101, x 505, the first one and the second one. That is part one. This is a dominating study on how if you change even you change the order, it is beautiful and ship will not change so that you could permit the the first one with the next one is still to find out, which is the order of the competition where I know is competition, right?

But for but for images, if you change the picture, the company will change, the company will change. Here is the intuitively to put the points into the picture. But you can't readily put the reorganized. You have to follow the they find a special smallest smoothness. Actually, this is article one manifold constraint. Spatial smoothness is a let's see, the 4 points. For example, 4 points are neighboring points in the three d space. You should put into the image. They are neighbor adjacent pictures. They are still close to each other. They are still neighbouring pictures in this way. A it will be meaningful, otherwise meaningful because that you want to perform the local information revision, right?

So I only use the local information, but you go. One point is the map here, 1 - 01 . 0. If you apply the convolution, the beta, the class will not be needed the smallest after the you can process. So you define how to use it true to the image. But because to the images that you can perform the solution of this image is new. It's the same. It's not a projection. It's a reorganization, not a projection. If you connect one point one picture as one point in the three d space, it's the three d model, but it's a 3 month.

So if you want to find the neighbors, so into the images, right? So that's no searching process. Just a step of one region that comes a pixel 3 × 3. They are neighbors. They all recommendation data structure to reference the data. Here. This is a if you are interested in kind of you can read it, the data, you can read the papers. You'll find more also. This is a single model. This is a single model for the dynamic sequence. That's a human motion. That is aa sequence that we will obtain 1 million. Instead of aa single unit, you will form. This is the one part. This is the one part. Yeah. In the past, this several years of the ab for the location, these students, for example, for this one of the fundamentals, right? The fundamental theory. So it's a provincial relation to find a by just imagine in your three states, if you know the attachment, do you know the attachment that if you use a software like the map invading the three d models, right?

But the three d models, you must know that uv map, the uv card, the uv card is that if you lower is something lower. Those are three d models that is the opgf format. The media problems, you will find the region is a part of mass. Did you find a list of? This is list of currency of vertices and list of basic list of to the party. The three part of the bill indicated for people attached that the picture will be map to which location for city market.

So it's a so after she crime parts of the national part of the match, the part of that is also the most popular data structure.

And the most part of data structure here you have you have the private manager, a speaker, ve and if vef is referring to the set of vertices on the set of edges, the set of faces, you get so that this is a triangle maps. This is a triangle maps on the maps.

This is a part of me. Sorry, look at that. And so this is a connection. So far from here, we introduce some basic problem on the map. Each of us across beyond here, at least the land. Otherwise, it will be an absolute, maybe it will be an actual. Also, each as last we don't have at least one place. Otherwise it would be. So they would actually also probably contract. So that is that. So for part of it, this is a definition of part of match. There are three sets. The what x says. And the x says is that before the face a a so that's a travel is one. The final is the each triangle is composed of three vertices, right? Universities and and the connectivity, the ad set will be which one else can.

Ok so here this is a we can define our patient. With each case, we can define our application. How do we find our nation? How do we find? We can use it? So here, that is possible. We just use a lot of the vertices. You indicate that our patient is that the orientation can become the part where clockwork. So this is a the concept of this. The order is so that this is the text. The things were text, 1234. This period is that we use this. This order. This is the contact problem. This is this is a complex complex. This is a problem. This is a complex. This is part one, a where is the 1 or 23? This is the power of us. We can use the order of all of the vertices ok to indicate application.

Here, we can use our face to our face activity, define the nominal, you find the nominal. So you just use the right hand. Yeah. I think you have them in the physics of the high school physics. The right hand is right here is the last the finger part of the operation. And the sound indicates the normal direction. The normal direction can show you and provide it is outwards. And then you outwards. The right hand rule is beginning is another direction. Here, that's in this example, you can define a cube, right? Use these purposes. Usa works. It will be one of you. This is a of the tax index is from a study from zero, a study from zero. That's the argument. The partner 03210321. The order is 0321. So 0321. You can use the right hand rule. This one, this is the output, which is aaa partial. They know which is how for the party and 23762376, we should go on with this. So our patient indicate is a novel.

There's a lot of actions cause powerful a so this thing is showing the not all that ok not every match is okok this is if you do, you just read aa match is article or not, but here is a roughly introducing not every match and not having matches on so that the mortgage trip, the mortgage trip a it's not only create part. That's not only this is the gist issue of not having actions on. So this is the final match calling the introduction of property. The relationship with all the farmers indicate the relationship, the number of vertices, the number of edge, number of faces. This one, let's say that the older formula, this is genius, three or genius is a closed model as an open model.

All the long years which just value of the relationship, it is some part of the part of the match is someone geometry, practical . of that. Shenzhen, if you have aa part of the match, if you check out this old world investment, it's a funny that how much you want.

So that's we can still context on the video. The context on the bridge is those are managers with our host. That is the genius in zero. If these are made them to show you the genius, what is genius? Computing is the number of holes is the number of holes over the three d models. The relationship became the number of in the number of the vertices, the edge, basically, this, all the farming. That's the application. That's a contribute. A this complex quality is that all the fun that goes? That's a cube, right? Also, the option. This is the issue that this is for the complexity. Next, to introduce the concept of what genius. The genius is defined as a large number of long, the second single curve is that I can be, you are on 77 tomorrow. So actually, this is the part of the, it's a definition. You give you the speaking example. So that's this one. The genius is a it's zero. The genius is zero. Thank you for you. You kind of draw a close the curve to separate this part is the genius zero.

But for this example, this one is genius, is the intuitive a a is a number of a Number of those over there. The three d models. That's this one. You can draw several here. You can a draw a one. This curve, if you or this way, you can draw to the closed curve, not in a second, the large number of knowing seven, close the curve without separating the city model. If a people is there for the bible, if in the genius right here is an older part of your change here for this is there for those are for value. This is a value. Those are integral value gstg is a number of g the relationship, the number of what is this dash? Basically, that is all. So this is why the genius is one and show you the number of parts of the edge and none of the basis. So you got interested, check the how you put it. It's all about. Therefore, this lecture just that for calling the map, it has a job between the number of faces, the number of edges, and the number of the vertices.

Also, therefore, a genius, gr is for manuals with boundaries. And b is the number of boundaries. We also have the older fund. We also have. So let's say this one is that on this model, this type of match. So we have 1,000 and we have 1,000. This is just wanted to change the tribunal quite a good match. A is a completely kind of as far. It is a lot of fun that doesn't hold. So that is the, this is some geometry part. The next one is for quite a match. How do you start with it? We define the definition is the three sets, right? We have to recommend is a indicate is a connectivity connect connectivity. Information is a the vertex, the coordinate, right? The symbolism data structure is the face of the text. The actually for the obj for the old media model, the format is a big problem. It is be from format. Is that is it use this data structure? Basic attacks?

I guess that's just to the list of vertices of. That's it. If even this quantity. It was this example. You started later, you just this is the x index. It started for text one by one. It's a perhaps this ok so you see about x one is that and if you download the whole media file, open the whole media file, you will find of the text is a start formula. Index 12342 purposes.

And this is a sleeping article ok this is a sleeping article. Also you will find a faceless basis is indicated which perhaps in that position. So that is in the face, which were taxes involved in this. We can use a coordinate to communicate with it. Also, we can use the associated with anomaly if the data contains a list of anomalies, if the data also give the two d touch of coordinate, we can also use the two d capture. Very good. You need in the case, that is if you open, I only get out. If you find out, you will find that a lot that is a piece of face started from this one, and you will find a in a number section. This is the number three, same here. So this one is a computer tax.

And basically I normal, I should be a normal interface. Is this associated with which here this is a list of a list of vertices is started 123. So there's three numbers you need to ask me about. And also, there is a list of that is the name of the novel, the other number 1230 k so here this is the just us it was just an index. So in this case, it will be questions in which group in the day. Yeah, this is a as a main instruction. So how do you start planning that? Yeah, also, there are other types of data from the mix and how and call that corner corner tables, but which one is good is also depends on the application. Google structure is a good structure is a a it's a should be considered efficient revenue. The revenue data structure is efficient to the downstream revenue process, also that's apparent.

So if you want to clarify, if you find a typical collapse, it is easy to find the products. Also, this is easy to modify the modification. We should consider different kinds of factors. If you want to a good legal structure. A it's a balance you are. Among these sentence, the party of Nash, the party of Nash, is all this advantage progress. But when we discuss the advantage and disadvantage, we should rather think I give them if it compared to which data strategy that's a fine project is a but connected that there is one that is connected Information. So you can save the starting space, but also you can introduce, it makes the competition and Challenge. But for part of the match that and and the connectivity, I actually we lost, obviously, it will be quite well, but it will benefit the function, nation or regular process. So that when we discussed about it and we have to it is compared to which one. So it can be very efficient regulate. That's the final plan. But for final match is the most popular the most population.