### CG\_week4\_lecture3\_1.5-20240923\_9月23日 09:54

说话人1 00:00  
Feature size, it will reduce the feature size. We can reduce the battery consumption, right? So it is a battery consumption also into the efficiency, right? It is a time cost, but actually reduce the time cost. If you apply the sample in this process, also introduce additional time cost ok how do you have this select on your partner? Another advantage of the . point card finance not possible. The part that is the as a it it's a feature interposition. Here, this is the first second animation is used to be duplicating the features. Here is the view that interpolation. How do you interpret? So like for this, after the last year, we only have 3 points, right? So each point without the official one. But for the segmentation, we want to obtain the for each part, the input point will be one of the only one we have based on the geometry location. If it on the geometry location, we can perform as a wicked combination. We did in a position here. This feature is a f is a feature defined on the linear ..

Here we w a the w is a week. So how to calculate the week? It's usually the distance. For example, we want to interpret the feature of this part. So we will calculate the distance to the neighboring the remaining parts. And if it's close to this one, the contribution, it's a larger problem. It's far away from this one. The contribution is more major resistance. We can do to put your provision. Here, this is some classification. Actress condition is that you can the time that is the accuracy 89 + . 2, this is a finance. This is a final class class can improve the classification. Another one becomes the dynamic, dynamic pieces and dynamic problems. You should know that one. So for this one, it's a it's the key innovation is the key innovation is instead we use a city graph is like a for previous and finance pass.

So if you want to find the neighbors right, aggregate the local information, we just calculate the euclidean distance over the geometry pipeline. Then if the geometry location is fixed, the graph is fixed, right? It will not change because the distance will not change for this. One is a dynamic branch, is to find the neighbors in a dynamic manner instead of calculated the distance over the three d coordinate, but calculated the distance over the features at different layers. You will build the graph of it to calculate the feature distance.

At different layers, the different neighbors and different groups of neighbors will be stepped.

Ok this is the pma but for other, it's a just the mlp okay? And the key module is edge com. It's edge on, actually, that is also an lp two. Given this partner. So it may be official. We will find the neighboring parts. The field is the difference to the central part and the neighbor to the network output, the feature.

We need a feature for each item. We will have a feature. But here this is how to find the neighborhood. This neighbor is based on official distance instead of the coordinated distance. So at different layers, in different layers here, you can observe a multiple layers. The ad com, you'll find the papers based on the feature distance. Instead of a coordinated distance, the geometry distance, even if is a geometry distance, because of the final location of your knowledge, the graph is a fixed and the graph is fixed and neighborly. Relationship is fixed. The leadership is fixed. But if you calculate the distance, the features, the neighborship will change. So here I will show you what's the difference. So that's this one. Is this example. Here you are out of this column a this is a calculated the distance in the euclidean space is to calculate the distance between the three d coordinate.

Let's we consider red part. This is red part. We want to find out the neighbors here. The yellow color indicator is closer to the part. Is a blue color is indicated in the following. The distance is larger. This is the first name who calculated the neighborhood, use the included distance. That is the distance between the three coordinate. This layer is we consider this column.

Basically, here we still the same ., the red .. You will find on this side, actually, if you calculate the utility distance, the user coordinate this, the distance is the following, right? The distance is larger. But if you calculate the feature distance, this feature is closer to because they are significantly identical, right? Both response to the left, right? The last of them, the table right here, you can observe it. If you find this is the left, left, right and right left. For this point, this is a reference .. You use that the left points and the neighbors. So in other words, if you select the semantically, they are semantically closer. They are symmetrical because both both parts respond to them, the next of the table, right? This is a this is the difference.

This is the difference. The feature space as the utility. Yeah, actually, it is also published intuitive, right? So we want to put the semantically identical. We get a symmetrical, identical parts. This is the the difference is the difference. He has a dynamic problem what the bbc and the performances are actually improved, improve the significant. But can you use it? What's the invitation? And you can improve the actress, you can improve that. Can you suggest that one equation? Can you suggest one equation? I wanted to improve the because we can in different areas to go to the ground, to find the neighbors. Yeah, it indeed improve the money. But what's the definition? It's kind of consuming also manner consumer. Because at a different name, you have to do the above financial neighbors. But if you calculate the find the neighborhood over the three d coordinates, the graph is fixed ok in the following year. They only the graph of me, but here is you have in different layers. We do the graph over the feature because the feature is different data different.

The distance between efficient will change layer by layer, the distance will change it. Here I am. So it's time consuming, have a couple of years calculate the distance that if you use a capital user can decide the vehicles for fishing. Also it's a memory consumption because we have this possible. You have to start with immediately. It's awesome memory consumption. Also, this is one significant limitation. And then we got from a little bit you and if you process the data point out of the ten, ￡10,000, he said it will be all over there.

So this is the main part. So here we find out that actually the there is no which method is good, which that way. That's good. This is your open partner. Pick the lab. If you follow the solution, knew that what is the 25, right? This is a true protection to find out is still open problem also. You can use the transformers, you can use the transformers. But actually apply transformer. A is a private, a is a it's very suitable for point time. You just take one point that it wasn't, right? The transformers computer, I don't know how to define the current, define a convolution over the direction signal, right? You just made a higher transform. Each time has it as one sample, right? As a token, and build the relationship between adding, for example, one, you can add into some add added 2 points.

This question is quite suitable for the transformer. It's quite simple for my car, but so why is the patients? If you process the original points, if you take one point of it, as one, for example, the prime positive, 103 points, you do not take one prime as a good. Are you really got no cash? All right. You found in the global pattern of the vision? And usually that will go back. It's still have a lot of how to scan the apply the orders. The order will be an issue. And you can do the recent data. Here, this is some of the part intention. In the following, we should use about applications, ok some applications about, that's our sample. Somebody is a question that you give me the super revolution and that if you want to increase the given, right?

The resolution is there, for example, ￡100 have 100, right? We want to increase the resolution to 200 × 200 or 400 × 400, right? You increase the size. And for the down sample, if it's a dense point of one, if it's a dense fine color, there is an information to be dominant, right? The information without we can be loss of clients, and we can be loss of clients. So the client policy can be correctly recognized for custom. So this is a law and the task already, a task are if some samples, if we remove supplies to ship, the ownership is still present, you kind of assume that the same object, if I use thoughts, a smaller vehicle, it's a beta volume we usually reduce.

And also the contested will reduce in the downstream. But we want to achieve it. If you reward some clients, the final policy can be corrected, custom and result compromise the classification items, and also the shipping construction. It's a here is one interesting. What is the 40 map? The 40 map, it's a like a big one you should figure out. It's like a given paper holding into your relationship and also the competition.

Partial part time that give you a scanner, the scanner of scanner object, you can only scanner from the one view, 1 % 1, the invisible part will be missing for my partition. It will be response to homes.

How do you compete with it? So a it seems it's like the limit depending it's not even depends if you given some images like some property images, this post, we want to do that missing pictures. So we got a few even missing pictures. So this is unique. Here. This is a this is the first one is half sample. This is the idea. The idea is that the purpose and the purpose is given aa sparse point on, we want to design a dialogue. If we want to design a dialogue to opinion sense, find out.

So the best time power will makes a so here you can observe if we, so for the fence . out, so what geometry is able to do it?

Introduce basically spot my power. You can follow the surface reconstruction, so manage how much would be able to. This is. We want to use the computation method. So you increase the resolution, you increase the number of points with some large geometry. It is in common. But you actually give it to, this is the purpose. And so this is the purpose. Here I show you the unique supervisor, this class a where is a quite common part? Right? So you made us, given the original image, we want to obtain identity in the higher resolution. But even december revolution is why, in part, is a is that its operation decomposition? It increases the size and increase the size. But for you may come with a super evolution. And additionally, if I had a revenue structure, right? You may have a relevant function.

How about the definition impossible, but to . out, how do you come over the condition? But how do you exactly increase the bottom line? So the challenge issue is how to increase them. The number of features, efficient infection. Is it clear that you have a problem evolution? So this is an image simply here, this is the first one. Peanuts come up something that work. This idea is a question. Yeah, and this idea is quite simple. It's simply at the first one to acquire. The idea is, as I mentioned earlier, is, is it to be increased, right? The original that you put it in a part, right?

At the one of, I probably, for example, increasing the number of times two times is the number of times the two and one. So for empires after the feature infection, you will obtain the envision, right? Then how do you increase the feature? 2 and 2 times? How do you increase the feature in 2 times? In this one? This part is a three classes. You give a point of a second, and you can find actions. This part, for example, a this is a channel ok the official division, ok the feature division. This is the n part. If you want to obtain increase the number of features. In this example, is r times increase the number of each r times. It's just a copy of which are now archives duplicate the feature archives.

And for each feature, use an independent llmlp to regress into apply it from aac emission. Three dimensions, just copy efficient r times. They use the mlp regress, the features to the clients. It regress the features to the clients. This is, but the limitation is quite above you. And you need mr networks to achieve r sample, r times the r sample. So the natural size, this is very much. The number of parameters is the number of private building huge. So this is the first block, is just simply just a duplicate of features. Partners, if the input is an times, will be obtained efficient. If you want to obtain r points, r is the assembly scale, and you just building in the features r times and the rest of the features between the part. It is a fully connected, maybe.

So this is the kr position just implicated the features on times, the use of network, independent r networks to repress. Here, this is the distance function, the last function, ok here. This is the efg efg love the barrel. The of some of the clients. The distance is a bunch of supply of a distance. It's like msemse it's better and less in distance last function. But as I mentioned earlier, so for emd for prime power, is that no correspondence of that? This function, actually, if you find to find the response, given applied xi we use this packet function to find the response, you have to make a distance.

So that means in the first moment is there are two steps. Ok you have to perform the vacuum. First, we calculate distance, two steps. So this is a question about. So if the 2 points after something, the upside of the price 2 points are too close. This is a to push away the 2 points if they are too close. And if you put that on me, so this is an impossible. Is that efficient to to avoid the 2 points to propose. Right? So here I show you the embi know. So the chamber business and earth organism.

Here, this is the emb the emb is the. So here find the function bijection function. It's a 1 to 1 magic. Ok here I give you an example. Let's say the two prime power is a the yellow. This is orange color and the blue color, ok two point color, and the orange color and the blue color. Here we want to calculate the distance, how? To calculate distance, we want to find out to the 1 to 1 mapping, such as the overall distance. We calculate the distance, then calculate the summation and to find out. In other words, if you find out one to one map such as the overall percentage, meaning is it clear? Two, givens, 123456, ok so the origin of prime power has 6 point. There's a blue point. Power also has 6 points.

So randomly, you compute the response on this one to this one, here is a response. Then calculate the overruns. The summation of this is six k of distance. But there is one case. The overall distance will be the smallest, okay? To find such a buyer, such a matter, such as that overall after building the response review of the 6 pairs, right? The 6 pairs, computer pair distance is not overall, the summation of these 6 pairs. But this is the smallest ok so this is the emp personal business. But for the chamber distance, this is not a 1 to 1 match. It will be a one to ok for example, the blue line now, right? There are two sides, right? Two sides. For example, for the original one, we will, for each final reveal in the blue ., we will find which final is closing to the particle. Here you go. This is because this one and so this arguments are close to this one. And also we will find for the blue pine power, each of the blue panda we will find a positive in the origin one, a a to find that such a bad encourage.

So a this is a chance for, yeah, the general expense is the it has a much higher efficiency, because it's not 1 to 1. And it's not a 1 to 1, because it can be a 1 ~ 1. Good. This is a to those common use the last function. How can you use? Here is some results. Next. Somebody, this is the input final. This is a service that we constructed as you put on. So here you have ourselves as a reconstructed service, is the best course planet geometry. It gives me. Right?

After sampling, seven gr to create can be recovered. But at all, this one do you know, this one can be recovered. So this is our century. The next one is, the u plus is down sample, down sample we want you. So you are on top. So here are time value. This is some is this example, the character a so here we want to build a network, the samples of apartment, another part of some like three parts. So we only use 12345, 5 points indicated to the character age.

Ok so you can still be classified as a cancer recognized character age. Ok this is the concept of the passport has done something. They generated the sum of the part from the this method is to generally actually is not aa sample of this situation. Ok so here, now the last option is to pass. So this is the last option to pass. The past loss. The past losses can be classification of the case. That means after the sampling. So the classification cost, we also use the classification network to supervise the sampling process ok such that as a sample will be correctly possible. Also, this losses to manage the the sample of buying costs, the distance between the that's agp in the input point power. And g is some sum of the point power.

So actually, for option, is the sample to find out to be a subset, it will be a subset of the point of peace ok the point in g the point, the point in g is a subset of the point of p the subset of rmb this is our function. But actually, this is the generation. So the idea is quite simple. So given find out, we use asnsn and actually, this is the final they do. So i've seen a global feature. And from a global feature, we do the regression network itself fully connected in. Here the input is earned. For example, you can set the number of the nodes. This element. If m is smaller, then we have a trip downside. We also limited optimize. The generated empires will be closer to the subset of into the p go to the subset of the pdp and also made back to the minimize the task force if it's a qualification.

Also, we shouldn't added the classification that was such as the time can be correctly pass time. This is a the children progression. Now we are busy the the supplement ratio for the as that so increases the down sampling. That line is from the left to the west side. The down some of the times only will become smaller and smaller. This is a to the possible one of the assembly and africa. For this aspect, if you put make, it will. If you preserve the classification happens, maybe if you preserve the classification here, if we reduce the number of 5 to 32 times. And for this one, the class we chat, this is you have 60 percentage. And for the task, you will use seven. This is the possibility of ok this one is total map. You can think this is as well as this semester, quite interesting. It's quite interesting. So it's also separate function, two seven, superman.

So the idea is a so I guess given you can find out, I perform the future instruction ok so this is the future instruction. You can usually find that or find that class. Class here, I obtain a lot of visions and final, the code word, a global vision code word.

Here we define a when you define a two d requirements, you said initially just that is the is this really the value 11 is 11, and then starting this way. And we want to use this location. Here is 3 year perception about, you mean, this is mlp if you want to use this global feature to try this, you can take this a as a paper, ok a four paper.

We want to give a system. We have to fold this folder, this paper for this paper, we want upon this issue. Okay? Why is on the holding that? Right, on the holding that is equivalent to folding this this two d grade to the three d shape. It is better for the paper, the three d shape ok so here this is the ￡42 apply the 40 operation. 2 times. Here we are in this. I'll put my property, just calculate if you want to treat this time around. You just have to do the check on this, just tapping it. I was in between. So folding is a very good. So that's why they say, you see, every shot of the paper, ok it looks you can fold it as a farmer situation. So this is you can put a lot of private people in classes in the cold water drive driver putting on.

So here is some examples. So what is the variations? Ok so the five k generation and k finally, this is what we give initial players. We are holding into different shapes. We are fully in different shape. Also, this is a this is enough the leadership and where this is the first goal in the second place. The following is the key, right? This is the key usable. And this is the at last time, this sample, if you use aa single, is formed of a complex shape, is a private challenge. But here we can remarkable with, so it's incredible. Just one way that respond to a local region, ok so we have for the multiple papers.

In this issue, I think one color is this one room. So a it's incredible a pilot holding local instead of local. Yes, at the global. So this is the one of the type as that. And we still have the last the last one is the competition is the purpose is that the purpose is right for this one. If you use the scanning devices to standard object, here, maybe we stand from aa typical perspective, ok so here of the magic regions for the reason, any reason will be missing? So we want to recover and we want to recover this. That means is this way is invisible scanning. We want to use a competition as it is another decision and to be called this event.

This is an input, this is the power to complete the missing to complete the missing regions Is a point of competition and trying to competition. There are many papers. If there are many papers, this one is to use the you use AA map, use fs map ok for the Mississippi region. For the missing region, we want to use the code and use the extract code that you will also get to find out. We define the initial readers is that I III fold the paper to cover this mission, the idea, fold the fold this for the paper to call it a recent region.

So this is the idea that extract the future. If we turn it off, or this is a car vehicle, right? Also, for this, we define the initial, we take this location for this initial data, cover this mission. The last page is there. This is method of for the sample method, assembly. This is the observer of crisis, right? Ok this crime, we want to preserve this part. But this part, the miss agreement, if you use the initial grade from a podium, the distribution will be different. This is the input, the observer find out. This is the initial grade. You now have a distribution with a different approach. The distribution will be different. Here, if you perform the fps of positive disk sample, you can observe the sum of the points is this part. This is recover the region, this is observed region. Here, the number of parts will be different, because the two parts are different distribution.

Ok here we want you. This is the the density of here somewhere. Here you have with this equation. If you come from a density equation, such that the two sides of reservation and recovery is the sum of the plans to the compatible the number of sample clients in each part. Would you compare?

So this is a I massive find other ok how this is the time for if you use the scanner, right? If you use scanner, we only scan the object from one perspective. Right? For example, the front of you from this side, you can observe I have on the back side, you kind of the how do you recover the price? This is the last page. And for this part is to get us, but this section has been happening for the cost project. It will be helpful for the past project. But in the final examination and no related question. Exactly. In the final examination, no real question. Just you guy the list of progress. In many cases, you need a model. I think it will be very helpful to seek a job. It is the engineering ok for three d data process. Also you'll be happy in the past month. But the final examination for the lecture, this we still have.