### Security\_week4\_lecture\_1-20240924

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Feature size, it will reduce the feature size. We can reduce the battery consumption, right? So it is a battery construction also into the efficiency. 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 finance is the as a it's a feature in the position. Here, this is the first second admission is used to be duplicating the features. Here is the view that interpolation. So how do you definitely? 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 can based on the geometry location. If it on the geometry location, we can perform as a wicked combination weighted 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 get the money, 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 distance. We can give them for your provision. Here, this is some classification. Actress condition is that you can the time that is the accuracy 89 + . 2 a 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 is a it's the key innovation is the key innovation is instead of we use a city graph, it 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 so this is the pma but for other, it's a just amlp ok and the key module is the edge com. It is edge com. It's edge com, actually, that is also I am not easy to 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, 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 to calculate 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 best 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. He has a dynamic problem, what the bbc and the performances are actually 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 it improve the because we can in different layers to go to the ground, to find the neighbors. It indeed includes a moment. But what's the definition? It's kind of consuming also manner consumer. Because at a different name, you have to do the above, find the neighbors. But if you calculate the find the neighborhood over the three d coordinates, the graph is fixed ok in the following layer. They only the graph of me, but here is you have in different layers. You do the graph over the feature because the feature is indifferently different.

The distance between efficient will change layer by layer, the distance will change it. Here I am. So it's time consuming. You 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 for let me go 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 a committee part. So here for fun part, actually, the there is no which method is good, which kind of way that's good. This is your open partner. If the lab, if you follow the solution, knew that what is the country, right? So the 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? You the transformer 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 classical for my car, but so why is the patients? If you process a good enough . 0 k if you take one point of it, as one, for example, the prime positive 108 points, you do not take 1 point of them as a good. Are you really got another cash? All right. You found the global pattern of the future and you use that a little bit, right? But it's still have a lot of how to scan the apply the orders and 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 a a give it right? The resolution is there, for example, ￡100 has 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 . of there is an information to be dominant, right? The information without we can do more supply and we can do more supplies. The prime policy can be correctly recognized for custom. This is a goal and the task already. The tasks 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 is the data volume we usually reduce and also the contested will reduce in the downstream.

But we want to achieve it. If you reward some products, the final power still can be corrected, custom and result compromise the classification items, and also the shipping construction. It's a here is what I was interested in. 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 to scanner or 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.

And how do you compete with it? So a it seems it's like the even depending it's not even depends if you give us some images like some property images best post. We want to do that missing pictures. So we got a feeling and missing pictures. So this is unique. Here. This is a this is the first one is not simple. This is ideal. 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, you are here dance, 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 ok if is sparkling power, you can open the surface reconstruction, so manage how much would be going 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 actually is a unique supervisor, this class, this 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 you aren't is a is that it's operation, in conclusion, 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 world. Peanuts on top something that work. This idea is a question. Yeah, this idea is possible is simply have 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 points about At the one of trying, 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 to increase the feature to 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, the feature equation. 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 parameters building huge. 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 can use a fully connected, maybe. So this is aaakr position, just implicated the features on times. They use a network independent r networks to repress. Here, this is the distance function, the last function.

Here this is the efg efg love to barrel. The after some of the clients, the distance is a bunch of supply of a distance. It's like mscmse it's better and less in distance last function. But as I mentioned earlier, so for emd for pint power, is that no correspondence of that?

This function, actually, if you find to find the response, given applied xi ok we use this attack function. To find the response. You have to make a distance ok so that means the first mode is there are two steps. Ok you have to perform the vacuum. First, we calculate distance, two steps. So this is a possible. So if the 2 points ups after up 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 post. Right here, I show you the embi know. So the em the chamber risks and earth organism. Here, this is the emb the emb is the. So here find the function by junction function. It's a 1 to 1 matching.

Here I give you an example. Let's say the two prime power is a the yellow, sorry. This is orange color and the blue color to . out 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 r and u prime power has 6 point. There's a blue point how it also has 6 points.

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 care distance is not overall the summation of this experience. This is the distance is the smallest ok this is the emp personal business. But for the chamber distance, it's not a 1 to 1 match. It will be a one to ok for example, the blue right 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, this argument output 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 a 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 to be. Good. This is a to those common use the last function. How do you use? Here is some results. Next. Are 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 a miss right after sampling. So seven gr to create can be recovered, but at this one can be recovered. So this is our century. The next one is the the u plus possible down, sample down sample. So we want you so give up 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 to indicate in the character age ok so you still can be classified as a concern recommendation, character age, ok this is the concept of the passport. We've done something. They generated the sum of the part from the this method is good. 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 these. 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.

Ok also this losses to measure the the sample of buying costs, the distance between the that's agp that you put the final power. And g is the some sum of the final power.

Actually. So 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 user regression network itself fully connected in. Here the input is earned. For example, you can set the number up to the notes. 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 people, go to the subset of the group to be, and also made back to the minimize the hospital. You face a qualification.

Also, we should have added the classification that was such as the time can be correctly a 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 right side. The down sum of the times only will become smaller and smaller. This is a to the past with another assembly and africa. For this aspect, if you put make, it will preserve if you preserve the classification atoms. Maybe if you preserve the classification. Here, if we reduce the number five is 32 times. And for this one of the class we chat, this is so there is a situation here. And for the past year, we use certain 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 kind of the code word, a global vision code word. Here we define a you define a two d requirements. You said initially, just that is is this really the value 11 is 11 and then studying this way. And we want to use this location. Here is three of perception about to be 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 do this little figure to fold this folder, this paper. For this paper, we want upon this issue. Why is on the phone in that? Right? On the phone in 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 here. This is the 42 times apply the 40 operation. 2 times. Here we are continue. I'll put my property, just calculate if you want to treat this time around. You just have the check on this. Just happening. I was in between. So folding is a paper. So that's why they say is the time to show the paper ok it looks you can afford it as a farmers situation. So this is you can put a lot of private people in class in the cold water drive driver putting on.

Here is some example, right? It is the area conditions. Ok so the five k generation and k finally, this is over be given initial grade that we are holding in different shapes. We are fully in different shape. Also, this is a this is about the leadership and where this is the first poll 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 is it kind of just one way that respond to a local region? Ok so we have for the multiple papers in the situation. I think one color is this one room. So a it's incredible a pilot holding local instead of local, the global.

So this is the one of the types 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 option, 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 scan. We want to use a competition as it is another decision to be part of this event.

This is an input, this is the power to complete the missing, to complete the missing regions Is a point of completion. There are many papers. If there are many papers, this one is to use the AA you use afs map for the Mississippi region. For the missing region, we want to use the code and use the instructive code that you will also be defined. We define the initial agreement 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 player, cover this mission. The last page is there. This is method of for the sample method, assembly.

This is that all several times is 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 line up. This is the initial grade. You now have a distribution with a different one. 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.

Here we found you this is the density of here somewhere. Here you have this equation if you come from a density equation, such that the two sides of reservation and recovery is some of the plans to the compatible the number of the sample plans in each part. Would you compare?

So a that is a massive final part of 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, how do you recover the best. This is the last page. And for this part is to get us, but this section is happening for the cost project. It will be helpful for the past project. But in the final examination, there's no related question. Exactly. In the final examination, no real question. Just you guy the list of progress in many cases to be in a while. I think it will be very helpful to seek a job. It is the engineering ok for three d in the past, also will be happy in the past month. But the final examination for the lecture, this is okay, this is happening.