### CG\_week6\_lec5Illumination\_Shading-20241014

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This model that she mentioned, as I mentioned earlier, the initial models actually is the farmer as a farmer to similar to that action of that action. Shooting method is actually is to be having a color, which is intensity of an average part of the service. So we have issue if you are about to distinguished, they need not around that. But she imagine the initial model just have found it to qualify for life on simulated life. First, we'd like to introduce the nine classes. So that's the average line. A it's a department of airport class. We approximate is happening. That is beautiful. Ok from all directions ok so that is an independent view of the location city dependent on the view of the education. This is the average path. It's also common environment life, and also everyone like the second time, it's quite a nice shot, quite a nice chance is that it's an ideal, better shots.

So on the final as well as that, actually, the key characters, if the light source in the distance line source ok If the light source, the distance line source, so the language is the language. The short of the parallel line. It can be short of the parallel line, but it was a close lecture. Yeah, it is a for the discipline, for example, that's the sunlight and the sunlight.

So the language can be sure to come out, which are but the closed lives of life is taking life, the table axis, the life is established in that way. So this is a few kinds of quite measures in 220 leisure. So the third one a is a spotlight. Spotlight is also doing as a searchlight search. That how do you know a power of being alive? So that this figure that's true, the spotlight. And also the area area license. So this is an area license. So the airline source is occupied a 51 or two emission network space so that this is the as we are. But also here is the to how about the two division have it? Two division have it. What's this about the area? That was, it can pass the soft shadows, it shock and share it like this equation. Shock to take 100 figure you have the boundary is not hard, probably of the shadow, a it's not hard.

So it's a shock about it, but it should be the intensity change value. It has to be true value. It's usually good if you generally constant, sharp shadows. So this is the form different kinds of light sources. The next part is the initial model. This model is awesome as a nightmare ok another model is becoming the kind of service part by simulating the life action.

You are simulated by my attributes. Actually, it's a huge computer to simulate a lot ok so that means we have to do that. Building a farmer, right? We can build a farmer to qualify for that. The life actually. So here i'm going to introduce the the formulation model. This is the class collection model, the class collection model, looking information model. Actually, it contains 3 kinds of you can contain the 3 kinds of of reflections. They can contain the 3 kinds of reflections, the afternoon reflection, if you reflection and second reflection, if you reflection.

So here I can show you the the appearance of these 3 kind of reflection for this.

Let's say this is the enemy reflection ok if you only use the enemy reflection, the regular, as I mentioned, after reflection is up, it's a bad online. So a a it's a uniform. And this is a diffuse reaction. The diffuse reflection, diffuse reflection, also uniform. If you reception, it's also uniform in chinese is the manufacture. Right? A is a diffuse reference. This is the spectrum of that.

Here you come out of the back, next of right, the next part perspective, reflection. It depends on the view of the patient ok if the view of the patient change, the life force change. So the appearance will change, and the appearance will change. So this is that the speculative section in china in junior section. So speculative, actually, it will be definitely 300 section. Yes. So we can update. This is the phone with the reaction and the phone refraction. So here the phone information models that this is summation of these 3 kinds of reactions. It's a summation of these 3 kinds of reflections. But how do you compromise? We have to use a formula to come from if you qualify each reflection, if you quantify issue. So then I made a introduce a detail how to quantify the reflection. How do you want? This formula is a this is the added interaction. Here we use ias intensity. They added reflection. This is that if you reflection, this subscript, the substrate asked me, is a the spectral reaction, the refractive intensity, the reflecting intensity and ion system is between the number of light shots, the number of light shots.

Here, I added a reflection, which is a common laws and which is a common law. So here is a particular reaction that the base on the normal life sources of life choices, the submissions, the formation is that fully initial model, but that is model here already in the details, how to quantify how to quantify this three refraction?

The first is an angular refraction. Yeah, so the avenue reflection, actually, it's a reflected animal life. It reflects an atomized by the surface ok so here that this is the average that is intensive. I see. It's equal in all directions, as I mentioned earlier for the avenue. I'm in the life is a uniform. It's uniform, independent of your location. So given the surface, we give our service that we can specify a lot of background life. The surface will reflect and the light. It's quite simple. It's a linear tra it's a linear tr and its advice intensity. Here we have a coefficient. Here is a coefficient, a it's an accurate reflection coefficient. It's accurate reflection coefficient in it is depends on the service of the product of material, different material. Pollution. Better. Yeah, so for the africa regression, I simple the question, meaning to the average like intensity to qualify the amount of the reflected the energy that at the surface, the second one, the second reflection that we kind of diffuse reflection ok if you're reflection.

So if you're reflection, is an incoming rate of life and equally reflected in added direction over the hemisphere theory, it's also uniform, independent of a is independent of us application. And it's independent of us application that here is a hong kong fund. How to quantify it? If you refresh, we can use this formula to quantify the reflected intensity, reflective intensity on the on the if you reflection.

And each part of the option is concerned, here there is an angle, the cosine theta, the angle is a this angle sigma. C is an angle between the, here n is a normal vector, surface okn is a normal vector of the surface. Error is indicated as a life direction in copy language ok so error is the fact that it was to the light source for the light source. Here, this is an angle between the normal vector and the left direction and that sort of direction. Here is a the reflective intensity. Is that possible? Science is pd in the coefficient. It is also the factor determined by the service property. It depends on the material. And iphone is a nice intensity. Iphone a is a lively intensive coming back in that source, the intensive life choice. Here, cosine is the angle in the normal vector and the direction to there. Let's talk here we can use them an error in the face of precisely and normalized ok now that we should receive the product of this to the case of the taxi.

Here, we know the so reflective intensity. When the fact intensive on the fury fashion is independent of us patient. It depends on the us patient. Also, it only related to the the service of property and the angle to the life source. Direction is a matter of direction. This is the annual season. So in the post relative to the the service code relative to them, that source. The third one is speculative for speculative reflection, is somewhat. The model is the model. Someone is good. Module codes are under the dash back to the theory of that. The stack of reflections is come from the black spot on the shining loss itself as bad as possible. So here give an example.

Let's say this is a dry asshole, broadway, ok this is a dry ass on the roadway. So it's a diffuse reflection, ok it's a diffuse reflection. If the wind vessels here, the water fuels in the previous, it will produce a spectral action. So the one that we have revised it will produce the resulting is better connection. So here this is a for the factory factions, the sunny surface change appearance. When the real product changes, if the side are using, you might change the real location, change the observed appearance, will change finance. We have one model.

We're modeling the spectral refraction. They remodel the spectral rejection. That means we have to consider the the revenue control the us the patient plan. They have to the view of the location.

First, we can consider this as I I respect spanish service ok so it's also is, in fact, a new fact, it's kind of europe, it carries most of as a microscope in that as a microscope before.

This is the energy group. Given if it's a why this kind of service, this is a common way and this is the effective way. And I I need the service now. Yeah, and the service normal. So we know this, you can see the l and the ego to see the ego. This is the higher respective. So this is highly respective service. Ok so this is the ideal standards. If it's a near the facts of the effect near factory effect. So we expect the higher. Here we expand the higher to fall quickly if the viewers. So that is, this arrow indicated the us application, indicated the us application.

This r is the ideal, reflective rate. Okr is a hydrogen temperature. Here. We expand the high level for all quickly. If the newest direction you make it from the island. That means if the angle between the v and r is the larger, so exactly intensity will drop quickly. We will drop rapidly ok so here is the best. I use an average different lenses to indicate. This is an angle. If the the viewers donation do it from the ipo actually significant. The light you drop significant, you are not leaving that.

You are not leaving that. In this way, we have produced a lifestyle. We can produce a nice part. So that means we have to consider this animal. Right? Wouldn't bother you that the model is better than actually, we haven't discussed this matter. The angle between the idea would have to be the viewer direction, the viewpoint, how to quantify? We can use this nonlinear function. We can use this nonlinear function to quantify it. Yes, here is a we need a coefficient ok service factor, reflection coefficient, becoming at the surface. The material product. I always become like intensity. And so here there's another angle. The five, this angle five is five. You can't to quantify the the difference between these r is the idea that we and v is a towards the view, give it a few parts. They indicate a big part five. Is the angle. Is this to that b and r and b and r here, the cosine phi is av is referred to the angle in vector v and vector r also, you would assume of v and r are normalized vector.

And normalize that is we can use the general product they are not to replace. Here there is as company. So this any is a the standard at home ok for me. What exactly I understand that is the infinity that is introduction. And we can use them as honorable controller control the harder life for. So here I show you the the behavior of the end. Ii show you the behavior. Here's the exponent and control the way of the energy. I'm sure that we are. So here in the seven different n and so n is larger. And so the intensity job more rapid, ok so the intensive job on that. So this figure issues are for the spectrum attention. Yeah, so it will increase.

And so the lives of the size on the last one guess models on the right here, it's more realistic. It's more relation was better than. So this is a behavioral evidence. So this is a behavioral as fundamental chinese. You can control the to construe the great offer of the far I need you to construe the great offer. So it's clear the 3 kinds of perfection. How do you compromise? So the dash, how do you use the following . that the direction security for we prove this. We put this is a 300 professional test ok so we set one reflection. So probably actually, now is that also, this is another this is my problem when we calculate it. So you must be model. We calculate the intensity. Also, like we can use this. We can use this in use this. It's hard on that. This is a the diminish model. The second part. The third part a is a shading method. And the third part of the shading method. This is the shading method, ok so see your methods also, as long as the subsidy resume as it is use the patterns to use the cover of intensity calculation from an information model to the top of the picture of color for all project position in the same.

That's if it's a triangle map, if it's a triangle match, the basic unit is a triangle. When we project the triangle to a two d space, multiple pictures will may be covered as. So multiple features may be covered by. So this is a limited plan. Here a this is a the triangle project be right? So we have to determine if the picture isn't within that. Also, we have a different company. If the point is a for this triangle, for the vertex, versatile the triangle, we can use the condition, one of the calculators economy.

But how do you determine the quiet within them? But how do you determine the color of of the color of the final vision? Actually, we can use different method. This is not like a cheating pattern. You can use slow shading and the flat shading and slow shading. Flat shape is motion. Here is aaa really produce the 2 kind of amazon. Why is the flat? Why is it flashy? The simplest fashion, actually as a negative fashion a it's just for the part of it. But all parts within a pilot jesse user, an identical part jesse use an identical part. The small chip is we expect the color will change mostly. We will be smaller as we expand. The product is mostly over the color. Here is a dog treating ok the graduate, the function for the broad machine and function is both under the slow sheet. But is it different for the guard shooting?

So here and use the first I show you the experience of history. Three, she invested, yeah. This is a flagship, maybe the flat trees. So here you can observe it. So this is the for each company that, right? For each group copy, that group here is the colors constant. The fluctuations for each partner, for each partner use an identical partner. Ok use a difficult color, ok the color will not change within this part. So here you will also discontinue, right? You will observe this case for the partnership. So keep on the color, cheap smoothie, right? The color is mostly, it's not risk, but compare them. As far as you mean on the phone reading, you can answer. This is the action, this is standard reflection. This respond to expected reflection. This factor of attention is more realistic to this one, right? This other reaction is moderate. This is the part of it for the bother, reading and functioning. Both are small shape, but for the partnership itself, interpolate is a color. For the function is you can put it a lot of weapons.

So later on, you should be the difference in this. So for the guardian, unfortunately, is a if they handle the standard fashion, so the period of the effects are different. It is more racing on the phone trading that should be the model is about the so the flat sheet, the flat sheet is for each part, we only compute the intensity value for us. All the whole party will be shaving is the same as you have. And I mentioned. So each find them. Is you the same? You can say. And so you realize that this continue.

You will also, this is quite fast. You also single, but it produce the cost reflections. Also, the observer discontinued. We take the chance of the pilots. They can adjust the pilots for the small treaty. So we need to know we have the proper test on that. We need to have a proper test on that, because we do it is an automatic calculate itself. Is it? And it calculate itself? Intensely using initial model here, we can compare the difference between the ground tree and the port tree. So the ground tree is a you can play with a color across here. I use a triangle dash. It's a higher triangle. We just interpret it. So that is a a given a triangle, we can use the initial model to calculate the for each for each of the types. We can use the diminishing model to calculate the intensity, the column. But if the part is within the triangle, so we can use the interposition. That's true because iaibs in, sorry, the three vertices, iaibic you can use a linear information or other advanced linear information to interpolate.

That's in this part of b we can use a linear information. A this is a partnership, but for the function, for the whole creation is not related. It it is interpreted as a novel effort. So that is for each triangle, for each triangle, the birthday that has a normal vector that is a then they nb and nc for this point of d we will deter probably the number better than d we will need a part of the number of md with nd then we can use the religion models would be calculated as intense.

So it's clear only based on this, if you have a farmer than you in, it will be the difference is the interpolation is the leading, this is a linear process. But for the spectrum that is not even because even why is it not leaving? So here I have to do that. This is ab c you can use the information model, calculate the intensity. That is ib ia ib I see a d given a quantum d let's say that the diminishing model is that we use. We use a function gok this is an initial model and give our clients. We need to know the also we assume the normal records, nanb and this is the nc for each time, each one tax on this, it's just a triangle. This is the information model, g we can give the normal exercise and they and other necessary information.

We can have to do that. In addition model, we can have to do with the in column, right? Also, for be similar, we can also do the initial model. So the necessary information and all of that and see also similar the necessary information. The top of that. Right here, we come to the ian so this is bokianbic then the next island is that we want to obtain the color. It's a pile of d id is equal to. Then we define another function. That's the hh is the linear interposition function. Ok opinion operation is a final. The input is iaibic iaibs is a will in the color of iod so this is the process of this is the process of partnership ok this is the part of the partnership.

How about the function? How about the function? The function is, interpolate is not a matter. This is ana nanb and c says it's not a lack of industry works, right? The first task, you can use a mediator with other india in operations. So that's interesting user, a function. Let's say we use a function. Issue is a linear equation here. We interpret the early and being, and as the ok here we is. The normal method is ndok then we use the function gg the initial model as a necessary information. Then we can copy, calculate it. I can be, what's the difference? This is a nonunion. This function is a nonunion. This function is a value that the initial model is an opinion that is for this one. So this is the second.

Now the first step is that the ddm 7 . 1 for this one is I you apply the the iaidic use a nonlinear function, then you are the second down with a linear function. It's a different order, but if both g and h are linear functions, actually it's the same. Even both g and h are linear function, actually examine the same. And this one, i'm saying, but one is the linear function. It's a nonlinear function. If I have different answers, it's different. So here and that's true. There's a difference. People are the vpn so is the drug machine on the country. So here you can observe the, we can consider this factory fashion. The spectrum reflection is in my inner graph. The specular reflection is a change. It's a treaty of an opinion matter.

If we use this matter to calculate each part, we use this matter of given upon, we interpret a novel vector, a use an information model, captain intensity. The special reaction will change even normally. Right? But if we interpret the cargo, as I mentioned earlier, this interpolation function is a linear function. Intuitively, you can think the interpolation is a the line. The interpol is part real change of us to the line, right? In other words, it's a special reflection to change in a medium level, right? But actually, we expect the spectrum of reflection good treating in a linear matter, right? For linear value should seeking into two cases. One is a straight line, one is a curve. It will not that the curve under the straight line will die over there.

So that's why is this example? Is this example here. You can observe this effort, reflection after the change changes smoothly, right? Because this is the huge color of operation that the column you observe, the light, the spectral reflection change, linear. But for this one, this is the height of this, the lattice bar in the job things. So this is the difference. If you understand this difference as far as pages, just show you the details. Yeah, you have to show that. So this is a laboratory, okay? The garbage is the intensity value is entirely for once for each of the taxes apartment. And so the intensity value of the inside of the partner up to the back in the political or tax value ok system. For this triangle, we have the three parts. We calculate the column and give a five when we just use it, just interpolate them for test column, just the interpreting the test card. So this is the stuff ok so sessions.

So we can opt in the For each one has become in the normal pattern. So this is just average adjacent based on here. That's what we want to. So here we want to obtain this for taxes, amount of effort for us. We can average the face somewhere. How is it? You with a normal vector, with a normal vector, you can use a definition model. And other necessary Information, you can calculate the intensity. And we can calculate the color of this test for each of the tests you can have with the power. For each context, we can carry the color, maybe mission model. There is a 7/7 medium Information.

India is a political tax intensity for the community. So a this is a triangle right here. It is final p we want to use the intensive iaibic to ask the intensive p so this is the final meaning.

Ok this is a binding Information ok so this is an ideal, actually, based on the distance between the three vertices in the three vertices to cover the contribution, ok to cover the contributions in its policies. A a it's a linear combination of the three parts of the company. This is a the limitations, the limitation of authority. The daughter she is, it doesn't probably handle standard kind of I submission to the spectrum. Hydrogen is a medium process. But so we use the media composition in the public intensity. Right? So if the especially for the n parameter is larger, n parameter is like, actually, the behavior of exponent have supported that. If there is a larger, the intensive, you jump off quickly, right? We'll do each other more rapidly. That is to produce a smaller like small, right? I guess, smaller, less, small.

But if it's a specular reflection, it gives a specular reflection focus on the attacks is fine. If the specular reflection, all of us on the taxi is fine. So let's do this example. Because for each of the tax, we use the Information online. For each of our tasks, we usually do this model to calculate the tests, right? So if you the standard reflection opposite, the tax is fine. Otherwise, so the produce that the produce the spectrum of defense, and that's part of the mass of history. Ok that's because of the deviate. Why is a deviate a function? But the standard prevention is made of us. So, yeah, so then the bargery is proposed is a possible proposed issue. But it can produce more realistic. It can produce more of this less part, but also the capacity is much higher. Ok the comparison is also much higher. Because for each of the task, because for each part, we have to use the illumination model, we have to calculate the initial model, use the Information model, calculate the economy.

But for this medium Information, for this function, the medium conditions, question, the complexity is much more. Is that? And it is not. And for this one is the first step. So that's a given giving us trying for us to be members. Remember the normal area of these three vertices. Unless if you want to calculate, is it the column is fine? So the first time you put it as a in the body is not evidence. You can use a balance or other interpretation. The interpreters are not that. Yeah, just immediately, what is not better? We all see the number left at this time. Then together with other necessary Information, there are one prize of the initial model. You've been in order to capture it when we got party test, I so this is the wonder he is a machine and whether you can under the function amount of the function is more risk, but the capacity much higher due to the calculation of the Information model for each part.

Yeah, so here we come. I we compare this. We should investment. We have to for the factory is simple or very fast, but less interesting policy. It's fine. It better than that should be. Question, functioning. But it's a faster function. This is the last page. So it's is that three parts, the head of service with mobile, the innovation model and achievement in this model achievement that are related. Primitive is a charge is that you make a lot of kinds of treating methods just in terms of so the part inside of 100 100 % intensity.

Here you are request for the conceptual three treating national, and also for the emission model. I the the menu is similar. That's a three category reflects the problem of the three category. So which one is unified? The dash depends on your innovation, make a single. And so in the following, that is Tracy. We can link. So in which model we can make the English models of interest.

Here is the light. How do you use the Information model to calculate the data? You ask the question. How do you relate Information about Canada is in section five are better treating which kind of do the file? Is an angle. How do you is? The meaning of the apple? Which apple should we know if you want to have? It is done. And so you can adjust it on. You should know the video that you should, which is, this is simple. It has 3 kinds of reflection.

So I want you. Yeah, so to be able to the final part is about a is a reputation should be. So the team will introduce the different geometry. The AP the invasive recommendation and explicit as a scientist confuse the occupancy on the boss. Back in the upper refuse, the scientist, refuse the outside, refuse and hardly share the surface. A it's a a geometry model. Yeah, because I mentioned there is a package of the competition is a fundamental problem, not so easy. Catra the representation is different. The doctrine of Alexander because of data structure. You have to design a different algorithm. They not lost the evidence of high depends on the representation, the element. I have a question for the election when we have a short break and we can start with.