Our Mathematical Senses

The Geometry Vision

Prof. Vijay Ravikumar

Department of Mathematics

Indian Institute of Technology- Madras

Lecture-27

Video 6C: A Shadow drawing challenge

So, in order to prove the 3D version of Dzarg's theorem, I want to return to the shadow drawing challenge from the intro video. So, in order to really better understand what the 3D version is even saying, let's see if we can figure out how to draw the shadow of this triangle as it would actually appear if we were viewing this scene. Now, let's remember what this scene consists of. It's a vertical lamp post casting light on a vertical sign board made of glass, and there's a triangle on that glass. And we want to know where the shadow of that triangle will sit. Where will it appear? Is it going to be over here, or maybe over here, or maybe over here? It could literally be in any location.

There's millions of ways to draw it, and only one way is correct. So, what is the correct location or way of drawing this shadow triangle? So, to do this, you need to print out this setup drawing from the link below, or copy it onto a sheet of paper. And if you're doing that, just so you know, you don't have to be super precise about every aspect of the image. There's like a lot of wiggle room.

It'll still work if you draw things a little off. But, it will be much easier to visualize and solve if both the street lamp and the sign board are vertical. So, if this and this line are parallel and vertical. But, to draw that, you may need to use a compass or a ruler or some measuring device. But after the setup, all you need to solve the challenge is a pencil and straight edge.

Now, as a hint, the real difficulty is knowing where the light rays from this light source, where do they hit the ground? So, for example, this top vertex here. There's going to be a ray of light that goes through it and casts its shadow, which will give us the top vertex of the shadow triangle. But, where will that sit? So, somehow, you can see that the light

rays are going to be the same. We need to know something about the ground plane to know where the light rays meet the ground. So, one thing to notice is that the street lamp is planted on the ground.

And similarly, the bottom edge of the sign is also planted on the ground. So, we know something about the ground. So, you have somewhere to start with. So, we'll see the solution next week. Sorry, not next week, in the next video.

But, I strongly encourage you to try it yourself before jumping into the next video. Because, like all the other drawing challenges, there's something that, there's a certain insight and understanding that you'll only get by physically doing it yourself on paper, with a pencil, with your hands. And I really do believe that. Just watching the video or even just thinking about it in your head is not really enough. So, get out a pencil and paper and do try it to the best of your ability.

And then you can compare your solution to the one in the next video. Or if you're stumped, at that point you can see the video and try and get a hint from it that way. So, good luck.