If you know the Actual Diameter of each pole (15cm, 10cm), and the Horizontal field of view (HFOV=72) of the camera that take the photo could you know the depth from the camera to each pole?

Yes, If We know the actual diameter of each pole, the horizontal field of view of the camera, we can estimate the depth from the camera to each pole. Here's how we can do it:

1- Calculate the angular size of the poles in the image:

Convert the actual diameter of each pole to the angular diameter using the Rule:
Angular Diameter = 2 * arctan (diameter / (2 * distance)),

- where diameter is the actual diameter of the pole
- distance is the distance from the camera to the pole.

Angular diameter = 2 * arctan (15 / (2 * 500)).

2. Determine the pixel coordinates of the poles in the image.

3. Calculate the angular distance of each pole from the center of the image:

- Subtract the x-coordinate of each pole from the center x-coordinate of the image to get the horizontal distance.
- Convert the horizontal distance to angular distance using the formula:
  Angular distance = (Horizontal Distance / Image Width) * HFOV,
  Horizontal Distance is the horizontal distance of the pole from the image center
  Image Width is the width of the image in pixels,
  HFOV: is the horizontal field of view of the camera.

4. Calculate the depth to each pole:

- Use the Rule: distance = diameter / (2 * tan (angular distance / 2)),

where diameter is the actual diameter of the pole

angular distance is the angular distance of the pole from the image center (calculated in step 3).

- distance = 15 / (2 * tan (0.1 / 2)).

Therefore, distance calculated in Step 4 is the depth from the camera to the pole with diameter 15 cm