HW on GCV course by Aleksandr Nevarko

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Homework on course Geometric Computer Vision contained 6 TODO's. Here I will describe my solutions for them.

1. get_view function:
   - pose_i contains the instance of the CameraPose class for transformation of points between camera and world coordinate frames.
   - imaging_i contains RaycastingImaging instance to transform from picture uv coordinates to 3d camera frame coordinates.
   - points_i - is the result of transforming from picture distance points to 3d points in world coordinate frame.
2. reprojection:

   Using CameraPose instance (pose_i), that knows the extrinsic parameters of the camera of depth map i, we transform j-th 3d points to i-th camera coordinate frame.
3. cKDTree:
   - cKDTree indexes the pixel points coordinates of the i-th depth map in some way, that after that it is easy to find distances to them.
   - We than query the kdtree with j-th points to find nearest neighbours and distances to them from the i-th picture space.

   Next TODO's were completed, but commented then (you can still see my solution). I commented them, because the following **python** *for* cycle was very slow and ineffective.
4. lines 104-107:
   - distances_to_nearest contains the distance for each point from j-th space to the closest point of i-th space. I used the calculated distance_2d, that was returned from the kdtree query to transform it from 2d distance to 3d and not to redo calculations.
   - interp_mask is the mask, that shows what points have a neighbour, that is not further, than distance interpolation threshold.

5. lines 126-127:

   I decided to take away from the *for* cycle everything except interpolation, so now *points_from_j_nns* has shape *(n_points, nn_set_size, 3 - dimensionality)*.

6. *for* cycle (128-138):

   - The cycle runs only over *True* cells in *interp_mask*.
   - Interpolator is created with coordinates of neighbours of each interpolatable point from j-th space.
   - Distances values are calculated via interpolator for each reprojected from the j-th to i-th space point.