Learning to Estimate Indoor Lighting from 3D Objects

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**GOALS**

1) From a picture of an object (known pose and geometry),
2) We learn to estimate the lighting conditions,
3) Then, we can render other objects with the estimated light.

**DATASET GENERATION**

1) We have selected 1600 images from the Laval Indoor HDR Database.
2) For each panorama, we manually labelled the approximate 3D geometry.
3) Each panorama can then be warped in a geometrically-consistent way, which effectively generates new lighting environment maps.

**APPROACH**

1) From a picture of an object (known pose and geometry),
2) We learn to estimate the lighting conditions,
3) Then, we can render other objects with the estimated light.

**RESULTS**

**AUTOENCODER REPRESENTATION OF ENVIRONMENT MAPS**

**NETWORK ARCHITECTURE**

**INDOOR LIGHTING ESTIMATION RESULTS**

**Code available!**

jflalonde.ca/projects/illumPredict

Input panorama
Approximate 3D geometry

Autoencoder loss: \( \mathcal{L}_{AE} = || c - c_{AE} ||_1 \)
Illumination predictor loss: \( \mathcal{L}_{c} = || z - z_{c} ||_2 \)