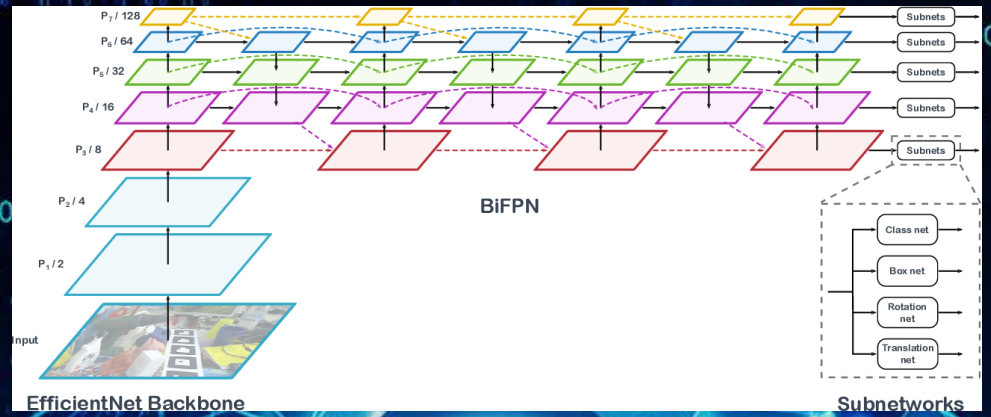


6D POSE ESTIMATION using DEEP LEARNING

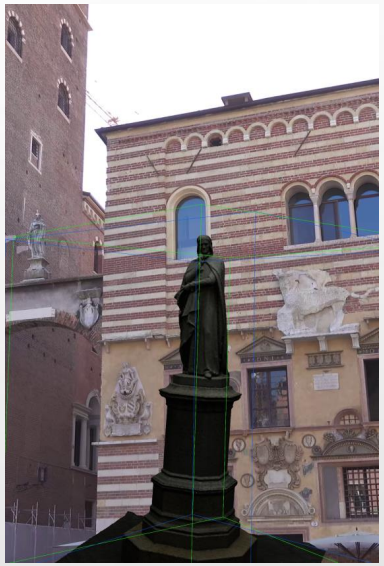
REPORT AND RESULTS

LUIGI PALLADINO

06/07/2022

Workflow of Development

1.Data Acquisition → 2.Data Cleaning → 3. Data Labeling → 4.Model Training



1. Synthetic Data Generation using Blender.

2. Convert dataset in pandas from csv to yaml format of **LINEMOD** dataset.

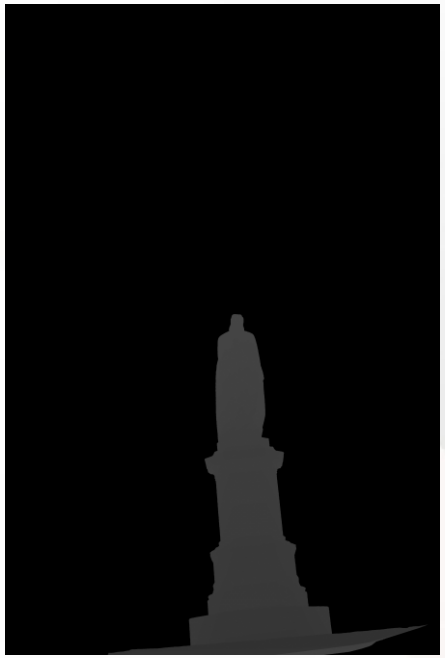
3. Splitting of dataset in training and testing. Preprocessing of testing dataset of "real images" made with Zephyr by 3DFlow.

4. Training of **EfficientPose** network
Testing on both Synthetic and "Real" testing sets

Synthetic Dataset Generation Output

Start from ply mesh

Move the object and save couples of rendering and poses:

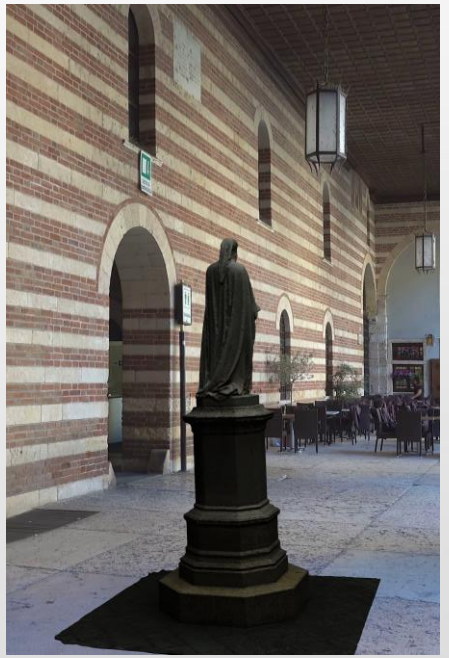


Further Processing

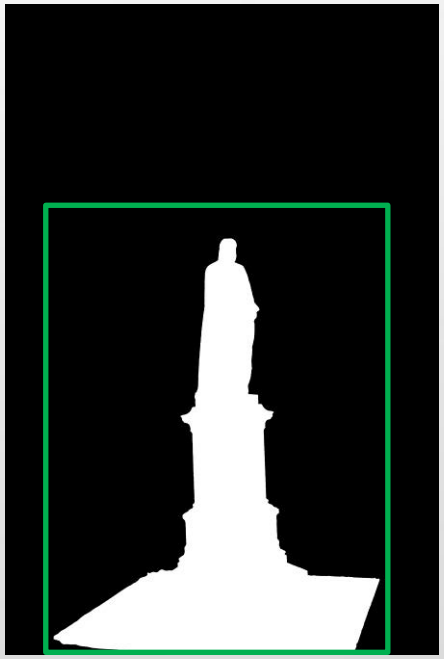
Extrinsic parameters

$$\begin{bmatrix} R & T \\ 0 & 1 \end{bmatrix}$$

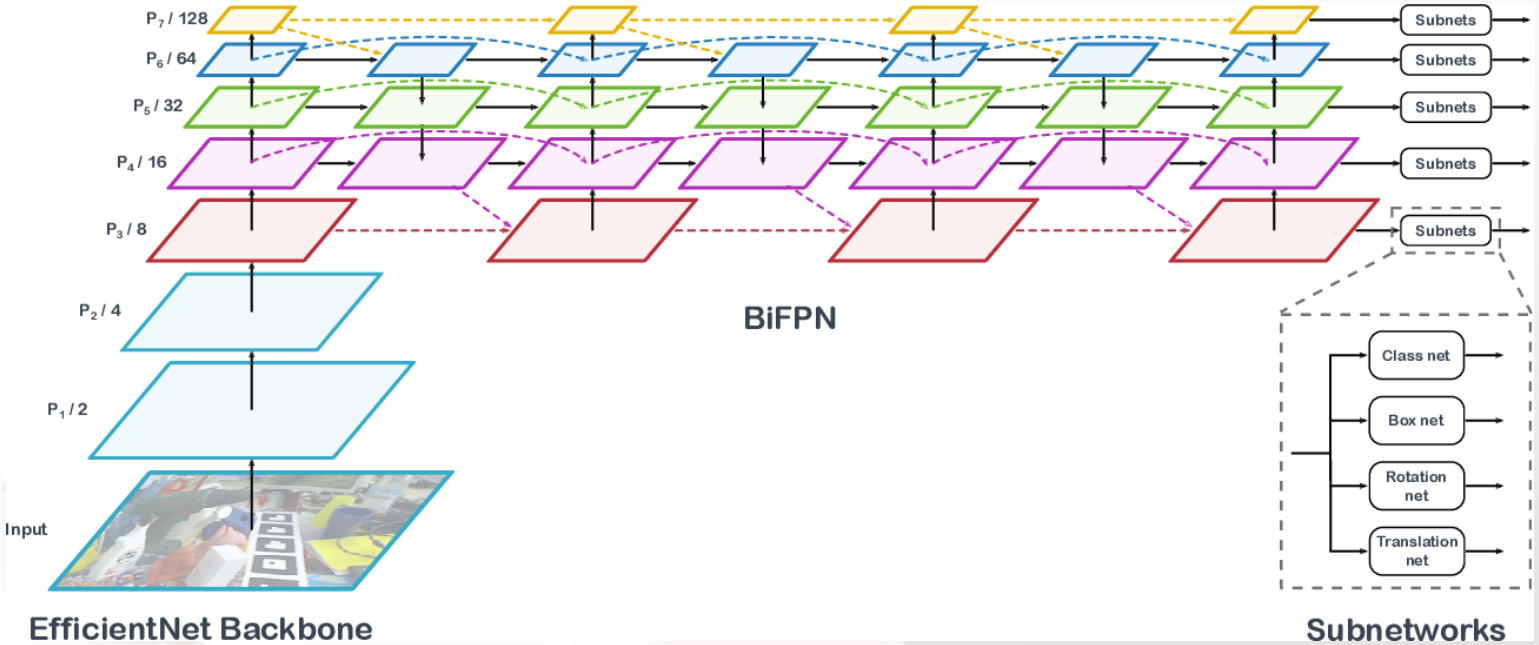
Used as input



Used to get bounding box



EfficientPose Training & Results



Results so far:

-120 epochs

-ADD: 96%

-Traslation error: ~1mm

-Rotation error: ~5°

Conclusion and Future Works

1. A system to henerate 6D Pose Synthetic Dataset in Linemod format using Blender was developed
2. Experimented the use with deep neural network EfficientPose.
3. The code produces rgb images with corresponding 6D Pose and depth images. Intrinsic matrix can also be set and printed from blender.

- Future Works could include production of a bigger synthetic dataset and the extraction of point clouds from depth images.