UNIVERSITÀ DEGLI STUDI DI PADOVA | DIPARTIMENTO MATEMATICA

University of Padua
Department of Mathematics "Tullio Levi-Civita"
Master of Science in Computer Science

Project of Vision Cognitive and Services: Instance Segmentation - SOLOv2 and DeepSnake

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Project content

The goal of our project is to study and compare alternative techniques to Mask R-CNN, for solving instance segmentation tasks.
First we will study Mask R-CNN, to understand its strategies and potentials, and then we will focus on the comparison of two alternative approaches, SOLOv2 and DeepSnake, that both seem to have better performances than Mask R-CNN.
Our activity will be divided into 3 steps:

1. Study of the papers (Mask R-CNN, SOLOv2 and DeepSnake), with identification of the differences in approach;
2. Training of the models, we will use the models present in:
   - https://github.com/zju3dv/snake/;
   - https://github.com/aim-uofa/AdelaiDet/.

   With the use of fine-tuning if necessary.
3. Evaluation of the models and subsequent report writing.

The datasets we will use to carry out phase (2) will be:

- MS COCO, used in the reference papers;
- Cityescape, for the evaluation of urban scenes, in order to assess systemicity;
- WildDash, contains difficult images and counter-productive camera characteristics, which should allow us to make some considerations about the robustness of the models;
- ExDark, contains low light images, to evaluate the response to the illumination challenge.

For Cityescape and MS COCO we would make use of the benchmarks suites.
For phase (3) we plan to carry out a quantitative assessment using at least the IoU and AP indices.
We will also investigate the possibility of changing the backbone and head architectures in SOLOv2 and Circular convolution in DeepSnake.
Any consideration we make will always take into account the official results obtained by Mask R-CNN.