Modelos de Segmentação Semantica baseados em Aprendizagem Profunda para Reconhecimento Interpretável
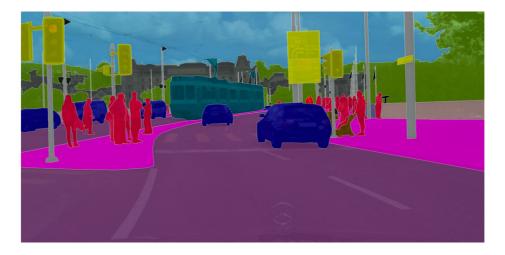
Proposta de Projeto

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1   Objetives

Pixel-wise image segmentation is a well-studied problem in computer vision. The task of semantic image segmentation is to classify each pixel in the image. Deep learning and convolutional neural networks (CNN) have been extremely ubiquitous in the field of computer vision, having turned extremely popular in tasks such as image classification, object detection and segmentation.

At the same time, "**Interpretability**" is nowadays a key concept in building intelligent automata, and has been motivating growing concerns in the research community. The increasingly larger quantities of data available led to models of increasingly higher complexity, with responses almost impossible to be intuitively interpreted by humans.

Figure 1: Example of a sematically segmented image of a road scene (taken from https://divamgupta.com/image-segmentation/2019/06/06/deep-learning-semantic-segmentation-keras.html).

In this context, the main goal in this project is to fuse concepts from the the above-mentioned fields: deep learning-based semantic segmentation and interpretable classification, and develop an automaton able to analyze pairs of periocular images and report "*how different*" a specific feature (e.g., the color of the iris, or the shape of eyebrows) is on such pair of images, providing the results in a visually pleasant and easily interpretable way.

2   Workplan

T1: Study of the state-of-the-art solutions for deep learning-based semantic segmentation;

T2: Adapt the selected framework to perform visually interpretable classification;

T3: Tests and optimization;

T4: Report writing.

3   Academic Prerequisites

- Interest about Artificial Intelligence and Machine Learning domains

- Interest in learning *Python + Tensorflow*.

4   Expected Results

- 1 computational prototype
- 1 report

5   Contacts

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