

# Zero-shot Interpretable Object Recognition

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## 1- Introduction

This work comprises the research and development of a novel framework for interpretable object recognition, based in detection/registration deep learning frameworks. The main idea is to start from an object mesh describing the 3D structure of one object and use generative deep learning frameworks to simulate learning instances of the corresponding class.

Next, based in the learning data obtained previously, a prototype for an interpretable object recognizer should be developed, using the concept of object registration, that should simultaneously be used for recognition and interpretation of the responses yielding from the model.

## 2- Keywords

Object registration; image matching; machine learning interpretability.

## 3- Objectives

The proposed work comprises the following consecutive goals:

- a) Development of a solution for generation of 3D meshes of objects, based in a set of images from the object, acquired from different poses.
- b) Development of a generative framework for synthesis of the learning data to be used in the subsequent phases of the project.
- c) Development of an image registration dee learning-based framework, able to match 3D shapes to 2D image data.
- d) Development of the interpretable object recognizer.

- e) Writing of a publication describing the work carried out, to be submitted to an international conference/journal.

## 4- Tasks

The following work plan is designed:

- 1- Comparative analysis of the object detection and tracking methodologies, in particular those based in deep learning architectures.
- 2- Design and development of a novel framework for interpretable object recognition.
- 3- Thesis writing.