Computer Vision - Bees!

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The objective of this exercise is to test and compare different methods for detecting bees in images. It consists of two parts (two mini-projects). The first mini-project focuses on the use of **"traditional" image processing/machine learning** methods to detect and count bees. In the second one, the goal will be to employ **deep learning** methods for this same task.

Figure 1: Sample Image

1 Submission Guidelines

You must submit one or two notebooks (one per mini-project, as you prefer) and auxiliary files before:

Tuesday December 19th, 2023

Your code should be properly commented to facilitate its understanding. Exchange of code between other students, and materials taken "from the web" is permitted, as long as it is clearly stated.

2 Data

The dataset chosen for this exercise can be downloaded using this link. More information about it can be found here here. The dataset is already split in train, val and test. Each part contains an image folder, and a label one. Each image has one txt file with a single line for each bounding box. The format of each row follows YOLOV7 labelling scheme (more info here).

3 Instructions

1. For the first part, start by trying simple methods ranging from color thresholding, with or without preprocessing, to template matching using a sliding window mechanism. You can use as many descriptors as you want. Then, continue by using those descriptors (e.g. HOG) in conjunction with some supervised learning models such as Linear SVM.

2. For the second part, you can use any deep learning model architecture you wish. Pre-trained models might give you better performances.

3. Finally, compare qualitatively and quantitatively (based on the performance on the test dataset) those different methods, and comment on their pros and cons.