# IATO: Feature Extraction for image analysis

**Fabio Celli**
University of Trento
Italy
http://clic.cimec.unitn.it/fabio/
fabio.celli@unitn.it

## Abstract

IATO stands for Image Analysis TOol, and is an open source feature extraction system for image analysis. It exploits low-level encoding to represent pictures in a vector of real-valued features. It does not require any library to run, is really fast and can be used as a baseline to compare the performance of algorithms in computer vision.

*Keywords*: feature extraction, computer vision, machine learning, image analysis, open source.

## 1 Introduction and Related Work

Many different libraries and algorithms for feature extraction in computer vision have been developed in recent years. In particular, some of these libraries can be exploited as descriptors of images, such as BRIEF (Calonder et al., 2010), BRISK (Leutenegger et al., 2011) and ORB (Rublee et al., 2011) and can detect shapes, color histograms and similar things. Some other techniques instead aim at finding keypoints in images, such as the scale invariant feature transform (SIFT) (Lowe, 2004) and its variants like bag-of-word-SIFT (Bruni et al., 2013). Alternatives to SIFT are speed-up robust features (SURF) (Bay et al., 2006) or the powerful Convolutional Neural Networks (Razavian et al., 2014). These tools have proven to be very useful in a very wide variety of tasks, such as recognizing objects (Zhou et al., 2009) (Shotton et al., 2009), faces (Luo et al., 2007), fingerprints (Park et al., 2008), crowds of people (Mei et al., 2014) and actions (Wang and Mori, 2009) (Yao et al., 2011), but either are based on large image databases or require really high computational power to run. Here we present IATO, an open source tool for feature extraction from images, that extracts the relative frequency of each byte value in the image file. This technique is very fast and does not require any library, nor high computational power.

## 2 Description of IATO

Here we present IATO, that stands for Image Analysis TOol, an open source feature extraction system for imae analysis vailable online[1]. It is a simple and very fast feature extraction system for image analysis that does not require any image database to run. IATO is based on image encoding and computes the relative frequency of each byte of the picture, plus some specific format encoding characteristics, like Huffman tables and quantization tables for jpeg format. Table 1 reports a description of the types and number of features that IATO can extract. IATO takes as input a set of .jpeg pictures and outputs a .arff file with one vector per line, representing each picture in the set. The .arff format can be used for machine learning in Weka (Witten et al., 2011) and the filename of the picture is used as target class for classification.

| feature type | features |
|---|---|
| rel. freq. of comments | 1 |
| rel. freq. of huffman tables | 1 |
| rel. freq. of quantization tables | 1 |
| rel. freq. of start of image chars | 18 |
| rel. freq. of fillers | 1 |
| rel. freq. of each byte value | 255 |

Table 1: Description of feture types in IATO.

[1] http://personality.altervista.org/fabio.htm

## 3 Conclusion

IATO is an open-source tool for image analysis, that can be used as baseline to test the performance of learning algorithms for numerous tasks in computer vision. In the future we would like to extend the number of features to cover different image formats, although, as it is IATO can extract 255 features from every type of format, while the remaining 22 features are specific for jpeg format.

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