Toolbox of Image Processing for Numerical Python

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Abstract. This work consists of the study, development and implementation of a toolbox of image processing for Python language [1]. This environment will be useful in education, research and development of final applications. The toolbox will be done using the easinesses of the Adesso project [2] for development of software of scientific computation.

1 Introduction

A generic computational tool for image processing usually offers two levels of programming: a script interpreted language serving for interface to a library of high performance normally written in C or Fortran. Python, as well as the Numerical package [3], offers this organization through a well-defined modular form to program. This association guarantees efficient multidimensional computation that is essential for image processing.

There are diverse appropriate tools for image processing nowadays. The objective is to congregate the positive features of platforms such as MATLAB and on-line image processing course such as the Digital Image Processing (DIP) using Khoros [4] into a freely available open system.

2 Python language

Python is a modern open source, interpreted, object oriented, very high level, rapid prototyping language, with an easy syntax (reads like “pseudo-code”), extensible (C/C++/Java), suitable for embedded applications, extremely portable and sufficiently efficient for our intention when associated to the Numerical package. Python has the flexibility of Perl, associated with the numerical power and easy of use of MATLAB, available as an open source environment.

Below we have an example of function in Python. The figure shows the output generated for a call to this function by typing cos2d([64,64],[12,16],pi) in the Python console:

from Numeric import *
def cos2d(s, T, Phi):
a1, a2 = range(s[0]), range(s[1])
x = resize(a1, (len(a2), len(a1)))
y = transpose(resize(a2, (len(a1), len(a2))))
return cos(2*pi*x/T[0] + 2*pi*y/T[1] + Phi)

3 Adesso environment

The Python Image Processing Toolbox is built using the Adesso authoring system. Adesso is an environment to design scientific components where most of the information is stored in a XML database and code, documentation and packaging are generated automatically using the Adesso engine. The methodology of the Adesso allows to a lesser effort of maintenance and management of the information, consistency in the user interface, flexibility in the presentation based on designed stylesheets, greater immunity to errors, among others characteristics.

4 Conclusions

The extensible Python language allows the efficient implementation of algorithms suitable for image processing. The toolbox being created with Adesso will be another option for the current MATLAB image processing toolbox being developed at DCA-FEEC-UNICAMP and used in its graduated courses, while retaining its compatibility.

References

http://www.python.org/doc/current/tut/tut.html

