Machine Learning and Computer Vision

Homework

Artificial Intelligence

1 Introduction

Knowing how to code is as important as understanding others' code. Thus, the goal of this homework is to familiarize you with understanding the code of others and the use of machine learning in computer vision tasks.

For this homework you have a tracking code[1] available. Your task is to understand and explain how the code works.

2 Details

1. This assignment will be done in pairs. So find a pair to work with.

2. Install OpenCV 3.0. You can find information on how to install it in http://docs.opencv.org/3.0-beta/doc/tutorials/introduction/table_of_content_introduction/table_of_content_introduction.html.

3. Download the code of the `camshiftdemo` from https://github.com/opencv/opencv/blob/master/samples/cpp/camshiftdemo.cpp.

4. Execute and understand the demo.

5. Write the explanation of what the demo is doing.

2.1 Report

Your report should be a **one page** explanation of the algorithm. The report can be in English, Spanish or Portuguese.

Note that the explanation should go through the main ideas and concepts used in the solution, and not to replicate the flow of the algorithm.

For example, consider the code shown in Fig. 1. A bad explanation could be

> The code reads an integer. Then calls a recursive function and computes the sum of two calls of the same function summing them by reducing the input by one and two, respectively.

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[1] https://github.com/opencv/opencv/blob/master/samples/cpp/camshiftdemo.cpp

```cpp
#include <iostream>

using namespace std;

int fib(int x) {
  if (x == 0)
  return 0;

  if (x == 1)
  return 1;

  return fib(x-1)+fib(x-2);
}

int main() {
  int n;
  cin >> n;
  cout << fib(n) << endl;
}
```

Code 1. Generates the Fibonacci number.

Note that the above explanation only repeats the code but in English. It does not add any information to what is happening in the code. A better solution can be

> A Fibonacci number, f_n, is computed through a recursive expression
>
> $$f_n = f_{n-1} + f_{n-2},$$
>
> where the initial values of the sequence are $f_0 = 0$ and $f_1 = 1$. This recursive equation is implemented as such through the function `fib`.

Although more solutions are acceptable, this gives a general idea of what we are looking for. Notice that high level concepts are explained (the Fibonacci sequence) that are not necessarily present in the code, and the translation of such concepts into the code. Unnecessary or general parts, such as reading the input are not discussed.

2.2 Due Date

The report is due to **October 5, 2016**. That is, you have one week to test and explain your findings.