Abstract

Title: Building a vision system for recording the course of a chess game

Image analysis and processing are widely used in many areas of today's technology, such as: automotive, automation, robotics, biotechnology and medicine. In cars, it can be used, for example, to detect lanes, recognize people, animals and objects on the road, warning about a potential danger. An essay describes the construction and tests related to the analysis of vision systems in stable stationary conditions on the example of a chessboard with figures. The aim of the work was to create a vision system thanks to which the course of a chess game will be recorded. First, an overview of the available solutions to the problem is presented and why it is beneficial to register a game in this way.

The paper describes the method of detecting the fields, analyzing and transforming the image before making the movement and after moving the figure. Account is taken of how the subtracted images from each other are used. Described is how to print the performed move and save it to a text file in the "PGN" format. After the game is finished, you can open the above-mentioned text file to be able to manually play the game in the future or copy it to any chess program to analyze the mistakes made during the game. The whole process of creating the program was also described, as well as the analysis of various variants of solutions and the selection of the most advantageous ones.

The program was written in Python using the "Open cv" library that implements the scheme saved in "PyCharm". The stand consists of a chessboard, chess pieces and a computer with a connected webcam placed centrally above the board at a distance of about 50 cm. At the beginning, the program is turned on to calibrate the webcam with the chessboard. Then set the pieces back to their starting positions just like the chess game begins. After approval, the game begins by making the first move with the white piece. Confirmation of the move is done by pressing the enter button switching the opponent's move. The program subtracts the properly prepared images and shows the center of gravity of the "white spot" where the figure was taken from and where it was moved. On this basis, it determines the movement that has been made. By default, the program knows the initial position of figures thanks to the field table saved in the program. Said display of the detected displacement follows and records the movement accordingly. Your move is saved in a new text file in the official "PGN" chess format. Black switches to move and the sequence repeats.

Keywords: Vision system, Image analysis, Chess, Python, OpenCV