Carnegie Mellon

Thesis Presentation

COMPUTER SCIENCE DEPARTMENT

5th YEAR SCHOLARS MS PROGRAM

Using Drone Cameras and Computer Vision Toward Improved Stabilization and Landing Algorithms

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Drones (or UAVs) equipped with cameras have been fast deployed to a wide range of applications, including agriculture, aerial photography, fast delivery, surveillance, etc. Similarly the growth and effectiveness of Computer Vision algorithms has led to widespread applicability and use in a massive variety of domains. Many commercially available drones make use of their camera systems to perform powerful tasks that are highly appealing to the consumer. Such tasks range from facial recognition, to motion tracking, to in some cases path planning and obstacle avoidance. The aspect of drone flight we wanted to focus on was stabilization over a target area and consequently landing in this chosen area. Stabilization algorithms on less advanced drones typically make use of on board sensors such as gyroscopes and accelerometers to try to keep the drone hovering in place. Additionally commercial drones that do incorporate visual features still struggle to achieve great performance in this realm. Similarly with the landing process, it is often the case that autonomous algorithms for it are done through the use of on board GPS and very little influence from visual cues. In this project, we aim to explore the possibility of incorporating more information into these processes using the downward facing camera on our drone of choice, the Parrot AR 2.0 drone. The bulk of our work makes use of training and evaluating neural networks to predict the position of the drone relative to a particular region of interest and testing our results by allowing the network to fly the drone by sending it controls corresponding to the predicted outputs. We will discuss the approaches we tried and what we found to perform better and worse, through both offline and online evaluation of the networks. We will also look at our implementations that we ported over to a physical drone and performed the aforementioned targeted landing algorithms.

Website: http://tinyurl.com/y6kwpwxu

Thesis Committee:

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