In this study, an RL-based optimal controller is proposed to recover the aircraft from flat spin mode to steady level flight in minimum time. A two-phase controller including an RL block is designed; in the first phase, angular velocity is attenuated to a safe margin, and in the second phase, the attitude controller restores the aircraft to level flight.

——Reinforcement Learning-Based Optimal Flat Spin Recovery for Unmanned Aerial Vehicle

This work investigates the application of deep RL to the heading and altitude control of fixed-wing aircraft and develops a software package to enable research in this area. Whereas previous works applying RL to aircraft control have simplified the problem by discretising the action space, reducing the number of dimensions in the state space, and provided human expert demonstrations, this project achieves full six degrees-of-freedom aircraft control with continuous actions and no human demonstration.

——Rennie\_Gordon

The objective of this thesis is to apply an efficient RL algorithm to the autonomous piloting problem and to conduct an experiment on the efficiency of a solution that aids to mitigate the adverse effects of unobserved factors in the environment

——Shcherbakov\_Dmitry\_2018-12\_MCS

In this paper, they have proposed a novel RL algorithm for fixed- wing UAVs flocking in continuous spaces and designed a double prioritized experience replay mechanism to speed up the learning.They solve the fixed-wing UAVs flocking problem within the RL framework in continuous spaces.

——wang19a

The advantage of RL:

considering parametric uncertainties and nonlinear morphing dynamics, Reinforcement learning is a promising upset recovery scheme in the sense of nonlinearity handling. Because a learning algorithm can reflect a cumulative reward from the present action, undesired trajectories.

One issue is that most current research relies on the accuracy of the model describing the prior knowledge of the environment. It is, however, very difficult to attain high accuracy in most realistic implementations, since the knowledge and data regarding the environment are normally limited or unavailable. Using reinforcement learning (RL) is a good approach to overcome this issue because it allows an aircraft to learn and navigate through the changing environment without an explicit model of the environment.

The weakness of RL:

The autonomous piloting task, however, has requirements that cannot be met by many RL algorithms.For example, the policy learned by the RL agent is sometimes difficult to converge due to environmental dynamics such as airspeed and side wind.