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The article discusses the problem of designing autonomous air taxis that can operate safely in non-deterministic environments. The performance measure for these taxis is to minimize the number of collisions and near misses with obstacles such as buildings, humans, and other aircraft. To accomplish this task, the taxis must be equipped with various sensors, flight control systems, emergency landing systems, and weather monitoring systems. The communication and coordination systems are also crucial for safe and efficient operation.

The problem can be framed as a Reinforcement Learning Algorithm, which is a type of machine learning that involves finding an optimal policy that maps states to actions to maximize a cumulative reward signal. In the context of collision avoidance for air taxis, the state is defined as the current position and velocity of the taxi, as well as the position of other objects in the environment. The action can be to accelerate, decelerate, or maintain the current speed and direction. The reward can be a negative value if the taxi collides with an object or a positive value if it successfully avoids a collision.

The Q-learning algorithm is a reinforcement learning algorithm that can be used to solve the problem of collision avoidance. In this algorithm, the Q-table is updated for each iteration based on the rewards received for each action taken in each state. The discount factor is used to calculate the discounted future reward for each action in each state. The updated Q-values are used to determine the optimal policy for the taxi.

In summary, designing autonomous air taxis that can operate safely in non-deterministic environments is a challenging task that requires the integration of various systems such as sensors, flight control systems, emergency landing systems, and weather monitoring systems. The problem can be solved using a reinforcement learning algorithm such as the Q-learning algorithm, which involves finding an optimal policy that maps states to actions to maximize a cumulative reward signal.

– Sattvik – 5/4/2023