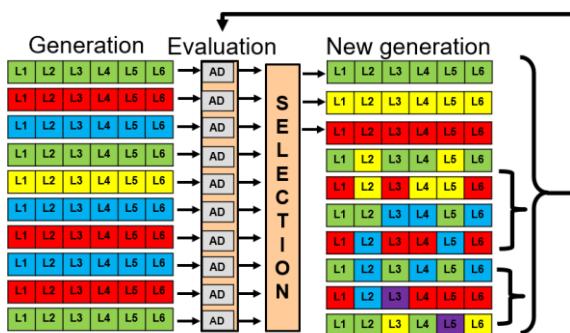


The optimization framework, where the algorithm provides the first guess, will take the first guess, use the IK, and calculate the cost function. Then the algorithm will determine if the structure is optimized or not. If it is not optimized, it will do the process again until the optimized structure is found. Created by: Omar Garrido



Genetic algorithm for the thesis. The GA started with an initial population that goes through an evaluation. Later the best chromosomes were selected and passed to the next generation. The population of the next generation was filled with crossover and mutation. The generation will go through an evaluation too. Created by: Omar Garrido

Optimization-Based Design of a Robotic Endoscope for Intraventricular

Robotic flexible endoscopes facilitate reaching challenging regions with only one incision, and help surgeons orient and navigate inside the patient. There is no guideline on how the endoscope's structure should be composed. We optimize the endoscope's structure based on the final configuration reaching the posterior third ventricle. The project's hypothesis is the following: Can the structural parameters of a robotic endoscope be optimized based on the desired endoscope's end configuration for the tumor removal in the posterior third ventricle? The proposed framework uses a genetic algorithm and the area between the desired path and the endoscope's final configuration, and the distance outside of the path. Various configurations had their optimized structure relative to the desired path, and the tendency that leads to a low cost structure. It also displayed their cost values through each generation. The results showed low cost structures that tried to be close to the desired path.

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