

AI-DESIGNED CAMOUFLAGE SYSTEM

Problem

In order for platforms to hide in plain sight requires camouflage schemes that blend well with the environment. It is hard to generate such a camouflage scheme that operates across a number geographical locations, seasons, and time of day. Some biological systems have evolved with an ability to adapt their appearance to conceal themselves to evade or to predate. In this proposal, inspired from nature's biology, we aim to develop a similar camouflage system which can be used for dynamically changing, cluttered and contested environments.

Expected outcomes

A computer program developed under publicly available software packages, to generate coloured designs and patterns that blends with the environment for different viewing angles and ranges. Essentially, this will be a coloured pattern (texture) generation program to conceal the target given spatial and colour information. The application at this point will be judged on its time of completion to generate a pattern both via computationally and algorithmic complexity (Big O Notation, etc.).

Technical requirements

- Software is preferred to be written in python. Python based libraries can be used for computer vision, machine learning and psychological analysis and observer trials.
- Preferred machine learning analysis is based on deep convolutional generative adversarial networks (DCGANs).
- The architecture of the deep learning need to be provided.
- Psychological theory such as perceptual control theoretic framework for prey/predator can be used to assess the target placement (subject to the blending environment).

- An approximate comparison between a real and synthetic (generated camouflage) need to be done, based on models provided by DST.

Data

- Unclassified background scene data will be provided by DSTG.
- Psychological model will be instructed and provided DSTG.
- Default targets data will be provided by DSTG.