Novel 3D Machine Vision Inspired By The Praying Mantis

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The Praying Mantis is the only insect proven to see in 3D
Its 3D vision is unique [1]
Its brain is 100,000 times smaller than a Humans

Could a mantis-inspired algorithm provide a new lightweight alternative for machine stereovision?

Depth estimation is an essential task
Natural Evolution favours stereovision (3D vision)
Most machine stereovision algorithms are very expensive

We constructed a 3D ‘cinema’ to study mantis vision
Behavioural and neurophysiological data reveals that the mantis has evolved distinct size and distance preferences for its prey
We used this as a guide to create a simple computational model of mantis vision based on its prey capture (or striking) response [2]

We recently discovered the neuron that governs 3D vision in the mantis [3]

We used Machine Learning to train our model to mimic the mantis’ size and distance preferences
The model sheds light on an unusual and previously unexplained observation – the mantis’ preference for larger targets at greater distances

We have produced the first model of mantis 3D vision
Our model is extremely simple and far more efficient than existing 3D vision algorithms
Applications include autonomous robots, self-driving cars, and augmented reality headsets
We are currently investigating ways to equip drones with mantis 3D vision

See the mantis in action by scanning the QR code!

Our model consists of an excitatory region in each eye, surrounded by an inhibitory region
The position and orientation of the excitatory region gives sensitivity to distance and target size.
Only targets at the right size and distance produce enough excitatory energy to strike.

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