

Assignment 1

Aim :

Briefing of selected Domain/Area including social relevance of the topic.

Objective :

To introduce selected topic in brief and understand its social relevance, potential applications and need for research.

Theory :

What are Artificial Neural Networks?

An artificial neuron network (ANN) is a computational model based on the structure and functions of biological neural networks. Information that flows through the network affects the structure of the ANN because a neural network changes - or learns, in a sense - based on that input and output. ANNs are considered nonlinear statistical data modeling tools where the complex relationships between inputs and outputs are modeled or patterns are found. ANN is also known as a neural network.

Practical Use

An ANN has several advantages but one of the most recognized of these is the fact that it can actually learn from observing data sets. In this way, ANN is used as a random function approximation tool. These types of tools help estimate the most cost-effective and ideal methods for arriving at solutions while defining computing functions or distributions. ANN takes data samples rather than entire data sets to arrive at solutions, which saves both time and money. ANNs are considered fairly simple mathematical models to

enhance existing data analysis technologies. ANNs have three layers that are interconnected. The first layer consists of input neurons. Those neurons send data on to the second layer, which in turn sends the output neurons to the third layer. Training an artificial neural network involves choosing from allowed models for which there are several associated algorithms.

Autonomous Driving using ANN

Convolutional Neural Networks (CNNs) are similar to ANN; they consist of a series of partially-connected layers with local connectivity and shared weights to allow detecting patterns irrespective of their position in the image. CNNs are naturally good at feature extraction using multiple local maps that arise from the original image. CNNs are provided with image of road as input and then it can generate steer values to decide in which direction it has to steer.

Social Relevance

Among the anticipated benefits of automated cars is the potential reduction in traffic collisions (and resulting deaths and injuries and costs), caused by human-driver errors, such as delayed reaction time, tailgating, rubbernecking, and other forms of distracted or aggressive driving.

If a human driver isn't required, automated cars could also reduce labor costs; relieve travelers from driving and navigation chores, thereby replacing behind-the-wheel commuting hours with more time for leisure or work; and also would lift constraints on occupant ability to drive, distracted and texting while driving, intoxicated, prone to seizures, or otherwise impaired.

Additional advantages could include higher speed limits, smoother rides; and increased roadway capacity; and minimized traffic congestion, due to decreased need for safety gaps and higher speeds.

There would also be an improved ability to manage traffic flow, combined with less need for traffic police, vehicle insurance; or even road signage since automated cars could receive necessary communication electronically (although roadway signage may still be needed for any human drivers on the road). Reduced traffic congestion and the improvements in traffic flow due to widespread use of autonomous cars will also translate into better fuel efficiency.

Widespread adoption of autonomous cars could reduce the needs of road and parking space in urban areas, freeing scarce land for other uses such as parks, public spaces, retail outlets, housing, and other social uses. Some academics think it could also contribute, along with automated mass transit, to make dense cities much more efficient and livable.

The vehicles' increased awareness could reduce car theft, while the removal of the steering wheel—along with the remaining driver interface and the requirement for any occupant to assume a forward-facing position—would give the interior of the cabin greater ergonomic flexibility. Large vehicles, such as trucks, would attain appreciably enhanced ease of use.

When used for car sharing, the total number of cars is reduced. Furthermore, new business models (such as mobility as a service) can develop, which aim to be cheaper than car ownership by removing the cost of the driver. Finally, the robotic car could drive unoccupied to wherever it is required, such as to pick up passengers or to go in for maintenance (eliminating redundant passengers).

Conclusion :

Thus social relevance of selected topic has been explained.