



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Modern Applications of Artificial Intelligence and Neural Networks: A Review

D.ASHOK, B.KARTHICK, R.KALAIVANI, N.KAYALVIZHI

ASSISTANT PROFESSORS IN COMPUTER APPLICATIONS

Department of Computer Applications,

DR.R.K.SHANMUGAM COLLEGE OF ARTS AND SCIENCE-INIDILI,KALLAKURICHI.

Abstract--This paper explores the applications of artificial intelligence and neural networks and provides an overview of the field, where the AI & NN are separately used and also where used together and discusses the critical role of AI & NN played in and business and medical applications.

Keywords: Artificial intelligence, Soft computing, Neural networks, Facial animation

I INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Artificial Intelligence is a combination of computer science, physiology, and philosophy. Artificial Intelligence (AI) is the area of computer science focusing on creating machines that can engage on behaviors that humans consider intelligent.

The ability to create intelligent machines has intrigued humans since ancient times and today with the advent of the computer and 50 years of research into AI programming techniques, the dream of smart machines is becoming a reality.

Intelligence is the ability to think, to imagine, creating, memorizing, and understanding, recognizing patterns, making choices, adapting to change and learn from experience. This is the branch of computer science concerned with making computers behave like humans. Hence it is called as 'Artificial Intelligence.

II. INTRODUCTION TO NEURAL NETWORKS

Neural Networks basically aim at mimicking the structure and functioning of the human brain, to create intelligent behavior. Researchers are attempting to build a silicon-based electronic network that is modeled on the working and form of the human brain!

Our brain is a network of billions of neurons, each connected with the other. At an individual level, a neuron has very little intelligence, in the sense that it operates by a simple set of rules, conducting electric signals through its network. However, the combined network of all these neurons creates intelligent behavior that is unrivaled and unsurpassed.

How the human brain works, it learns to realize patterns and remembers them. Similarly, the neural networks developed have the ability to learn patterns and remember. This approach has its limitations due to the scale and complexity of developing an exact replica of a human brain, as the neurons number in billions! Currently, through simulation techniques, people create virtual neural networks.

III. APPLICATIONS OF NEURAL NETWORKS

Evolu Evolution of Neural Networks for Control of Pursuit & Evasion:

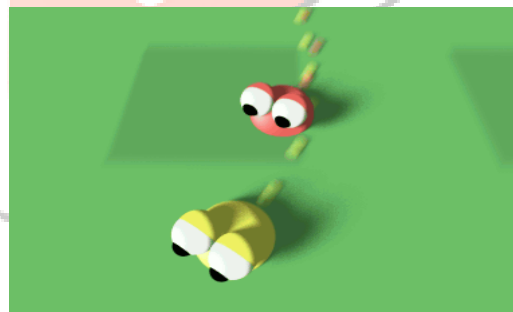


Figure.1 Movie sequences illustrate behavior generated by dynamical recurrent neural network controllers.

The following MPEG movie sequences illustrate behavior generated by dynamical recurrent neural network controllers co-evolved for pursuit and evasion capabilities.

From an initial population of random network designs, successful designs in each generation are selected for reproduction with recombination, mutation, and gene duplication.

Selection is based on measures of how well each controller performs in a number of pursuit-evasion contests. In each contest a pursuer controller and an evader controller are pitched against each other, controlling simple "visually guided" 2-dimensional autonomous virtual agents.

Both the pursuer and the evader have limited amounts of energy, which is used up in movement, so they have to evolve to move economically. Each contest results in a time-series of position and orientation data for the two agents. These time-series are then fed into a custom 3-D movie generator. It is

Important to note that, although the chase behaviors are genuine data, the 3D structures, surface physics, and shading are all purely for illustrative effect.

Learning the Distribution of Object Trajectories for Event Recognition: This work is about the modeling of *object behaviors* using detailed, learnt statistical models. The techniques being developed will allow models of characteristic object behaviors to be learnt from the continuous observation of long image sequences.

It is hoped that these models of characteristic behaviors will have a number of uses, particularly in automated surveillance and event recognition, allowing the surveillance problem to be approached from a lower level, without the need for high-level scene/behavioral knowledge.

Other possible uses include the random generation of realistic looking object behavior for use in Virtual Reality, and long-term prediction of object behaviors to aid occlusion reasoning in object tracking.



Figure 2: Object Trajectories for Event Recognition

The model is learnt in an unsupervised manner by tracking objects over long image sequences, and is based on a combination of a neural network implementing Vector Quantization and a type of neuron with short-term memory capabilities.

Models of the trajectories of pedestrians have been generated and used to assess the typicality of new trajectories (allowing the identification of 'incidents of interest' within the scene), predict future object trajectories, and randomly generate new trajectories.

Radiosity for Virtual Reality Systems (ROVER): The synthesis of actual and computer generated photo-realistic images has been the aim of artists and graphic designers for many decades. Some of

the most realistic images were generated using radiosity techniques.

Unlike ray tracing, radiosity models the actual interaction between the lights and the environment. In photo realistic Virtual Reality (VR) environments, the need for quick feedback based on user actions is crucial.

It is generally recognized that traditional implementation of radiosity is computationally very expensive and therefore not feasible for use in VR systems where practical data sets are of huge complexity.

There are two new methods and several hybrid techniques to the radiosity research community on using radiosity in VR applications. On the left column, flyby, walkthrough and a virtual space are first introduced and on the left. On the right, one method using Neural Network technology is shown.



Figure.3 Radiosity for Virtual Reality Systems: Learning from Example.

Autonomous Walker & swimming Eel: The research in this area involves combining biology, mechanical engineering and information technology in order to develop the techniques necessary to build a dynamically stable legged vehicle controlled by a neural network. This would incorporate command signals, sensory feedback and reflex circuitry in order to produce the desired movement.

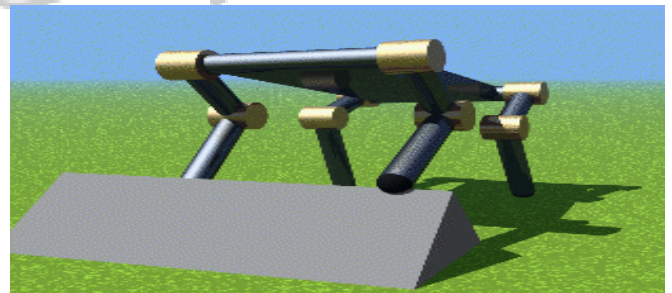


Figure 4. Autonomous walker.

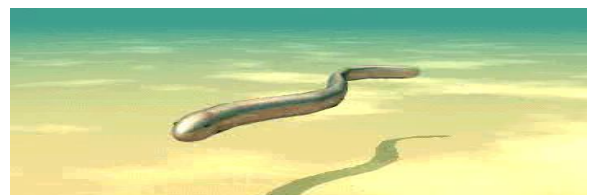


Figure 5. Simulation of the swimming lamprey (eel-like sea creature), driven by a neural network.

Facial Animation: Facial animations created using hierarchical B-spline as the underlying surface representation. Neural networks **could** be use for learning of each variation in the face expressions for animated sequences. The (mask) model was created in Softimage, and is an early prototype for the character "Mouse" in the YTV/ABC televisions series "Reboot" (They do not use hierarchical splines for Reboot!).

The original standard bicubic B-spline was imported to the "Dragon" editor and a hierarchy automatically constructed. The surface was attached to a jaw to allow it to open and close the mouth. Groups of control vertices were then moved around to create various facial expressions. Three of these expressions were chosen as key shapes, the spline surface was exported back to SoftImage, and the key shapes were interpolated to create the final animation



Figure.6

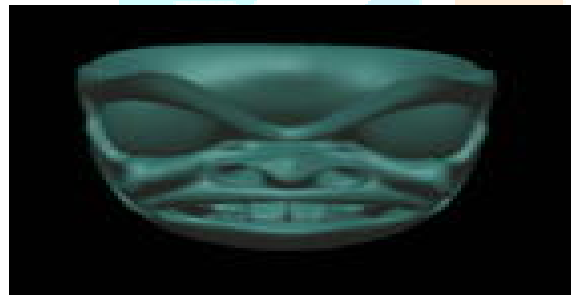


Figure.7 Facial animations using hierarchical B-spline.

IV. APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Data Mining: Discovery of meaningful patterns (knowledge) from large volumes of data.

Expert Systems: A computer program for decision making that simulates thought process of a human expert.

Neural Networks: Tool based on the brain analogy.

Fuzzy Logic: Theory of approximate reasoning.

Artificial Life: Evolutionary Computation, Swarm Intelligence.

Evolutionary Computation.

Artificial Immune System: A computer program based on the biological immune system.

AI also Used in : Pattern recognition, Optical character recognition, Handwriting recognition, Speech recognition, Face recognition, Artificial Creativity, Computer vision, Virtual reality and Image processing, Diagnosis (artificial intelligence), Game theory and Strategic planning, Game

artificial intelligence and Computer game, Natural language processing, Translation and Chatter bots.

V. APPLICATIONS OF ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

The goal of artificial intelligence and neural networks is to create smart machines that can perform complex tasks on their own. Application of artificial intelligence & Neural Network is possible in every field, where intelligent analysis, precision and automation are necessary.

Swarm Intelligence: This is an approach to, as well as application of artificial intelligence similar to a neural network.

Here, programmers study how intelligence emerges in natural systems like swarms of bees even though on an individual level, a bee just follows simple rules.

They study relationships in nature like the prey-predator relationships that give an insight into how intelligence emerges in a swarm or collection from simple rules at an individual level.

They develop intelligent systems by creating agent programs that mimic the behavior of these natural systems!

Heavy Industries and Space: Robotics and cybernetics have taken a leap combined with artificially intelligent expert systems.

An entire manufacturing process is now totally automated, controlled and maintained by a computer system in car manufacture, machine tool production, computer chip production and almost every high-tech process.

Computer Science: Researchers in quest of artificial intelligence have created spin offs like dynamic programming, object oriented programming, symbolic programming, intelligent storage management systems and many more such tools. The primary goal of creating an artificial intelligence still remains a distant dream but people are getting an idea of the ultimate path, which could lead to it.

Aviation: Airlines use expert systems in planes to monitor atmospheric conditions and system status. The plane can be put on autopilot once a course is set for the destination.

Weather Forecast: Neural networks are used for predicting weather conditions. Previous data is fed to a neural network, which learns the pattern and uses that knowledge to predict weather patterns.

VI. CONCLUSION

This Paper explained applications of artificial intelligence & neural networks to create intelligent behavior, and how AI and NN is a combination of computer science, physiology and philosophy.

Artificial Intelligence is the area of computer science focusing on creating machines that can engage on behaviors that humans consider intelligent.

Examples were given to show how artificial intelligence & neural networks are used in applications like Pattern recognition, Autonomous Walker & Swimming Eel, Facial Animation, Artificial Creativity, Computer vision, Virtual reality and Image processing, and Strategic planning etc.

VII. REFERENCES

- [1] Rich, Knight and B Nair, “*Artificial Intelligence*”, TMH Publication
- [2] Jacek M . Zurada, *Introduction to Artificial Neural System*”, Jaico publishing house.
- [3] P Venkatesh, R Venkatesan, “A Survey on Applications of Neural Networks and Evolutionary Techniques in Web Caching”, *IETE Tech Rev* 2009;26:171-80.
- [4] R.J. Lippman, An introduction to computing with neural nets, *IEEE ASP Msg.* (April 1987) 4-22.
- [5] <http://www.cogs.susx.ac.uk/users/davec/pe.html>.
- [6] <http://www.cs.ubc.ca/nest/imager/contributions/forsey/dragon/anim.html>
- [7] <http://tr Alvex.com/rover>.

