Glossary

Artificial Intelligence: is the mimicking of human thought and cognitive processes to solve complex problems automatically. AI uses techniques for writing computer code to represent and manipulate knowledge.

Autonomous: Operating without pre-programmed behaviors and without supervision from humans.

Action-Based Planning: The goal of action-based planning is to determine how to decompose a high level action into a network of sub actions that perform the requisite task. Therefore the major task within such a planning system is to manage the constraints that apply to the interrelationships (e.g., ordering constraints) between actions. In fact, action-based planning is best viewed as a constraint satisfaction problem.

Agents: Agents are software programs that are capable of autonomous, flexible, purposeful and reasoning action in pursuit of one or more goals. They are designed to take timely action in response to external stimuli from their environment on behalf of a human. When multiple agents are being used together in a system, individual agents are expected to interact together as appropriate to achieve the goals of the overall system.

Agent Architecture: There are two levels of agent architecture, when a number of agents are to work together for a common goal. There is the architecture of the system of agents, that will determine how they work together, and which does not need to be concerned with how individual agents fulfill their sub-missions; and the architecture of each individual agent, which does determine its inner workings.

Algorithm: An algorithm is a set of instructions that explain how to solve a problem. It is usually first stated in English and arithmetic, and from this, a programmer can translate it into executable code (that is, code to be run on a computer).

Associative Memories: Associative memories work by recalling information in response to an information cue. Associative memories can be auto associative or hetero associative. Auto associative memories recall the same information that is used as a cue, which can be useful to complete a partial pattern.

Camera: A camera is a device used to take pictures, either singly or in sequence. A camera that takes pictures singly is sometimes called a photo camera to distinguish it from a video camera.

Decision Theory: Decision theory provides a basis for making choices in the face of uncertainty, based on the assignment of probabilities and payoffs to all possible outcomes of each decision. The space of possible actions and states of the world is represented by a decision tree.

Degrees of Freedom: The number of independent variables in the system. Each joint in a serial robot represents a degree of freedom.

Dexterity: A measure of the robot's ability to follow complex paths.

Dynamic Model: A mathematical model describing the motions of the robot and the forces that cause them.

Egomotion: determining the 3D rigid motion (rotation and translation) of the camera from an image sequence produced by the camera.

Tracking: following the movements of a (usually) smaller set of interest points or objects (e.g., vehicles or humans) in the image sequence.

Optical Flow: to determine, for each point in the image, how that point is moving relative to the image plane, i.e., its apparent motion. This motion is a result both of how the corresponding 3D point is moving in the scene and how the camera is moving relative to the scene.

End-Effector: The robot's last link. The robot uses the end-effector to accomplish a task. The end-effector may be holding a tool, or the end-effector itself may be a tool. The end-effector is loosely comparable to a human's hand.

Edge Detection: Edge Detection marks the points in a digital image at which the luminous intensity changes sharply.

Expert System: An expert system encapsulates the specialist knowledge gained from a human expert (such as a bond trader or a loan underwriter) and applies that knowledge automatically to make decisions.

Frame grabber: An electronic device that captures individual, digital still frames from an analog video signal or a digital video stream.

Game Theory: Game theory is a branch of mathematics that seeks to model decision making in conflict situations.

Grayscale: A grayscale digital image is an image in which the value of each pixel is a single sample. Displayed images of this sort are typically composed of shades of gray, varying from black at the weakest intensity to white at the strongest, though in principle the samples could be displayed as shades of any color, or even coded with various colors for different intensities.

Genetic Algorithms: Search algorithms used in machine learning which involve iteratively generating new candidate solutions by combining two high scoring earlier (or parent) solutions in a search for a better solution.

HSV Color Space: The HSV (Hue, Saturation, Value) model, also called HSB (Hue, Saturation, Brightness), defines a color space in terms of three constituent components: Hue, the color type (such as red, blue, or yellow), Saturation, the "vibrancy" of the color and colorimetric purity and Value, the brightness of the color.

Inference Engine: The part of an expert system responsible for drawing new conclusions from the current data and rules. The inference engine is a portion of the reusable part of an expert system (along with the user interface, a knowledge base editor, and an explanation system), that will work with different sets of case-specific data and knowledge bases.

Inverse Kinematics: The inverse kinematics problem is to find the robot's joint displacements given position and orientation constraints on the robot's end-effector.

Jacobian: The matrix of first-order partial derivatives. For robots, the Jacobian relates the end- effector velocity the joint speeds.

Joint Space: A coordinate system used to describe the state of the robot in terms of its joint states. Inverse kinematics may also be thought of as a mapping from end-effector space to joint space.

Machine Learning: refers to the ability of computers to automatically acquire new knowledge, learning from, for example, past cases or experience, from the computer's own experiences, or from exploration.

Machine Vision: Machine Vision is the application of computer vision to industry and manufacturing.

Motion Perception: MP is the process of inferring the speed and direction of objects and surfaces that move in a visual scene given some visual input.

Neural Networks: Neural Networks are an approach to machine learning which developed out of attempts to model the processing that occurs within the neurons of the brain. By using simple processing units (neurons), organized in a layered and highly parallel architecture, it is possible to perform arbitrarily complex calculations. Learning is achieved through repeated minor modifications to selected neurons, which results in a very powerful classification system.

Pattern Recognition: This is a field within the area of machine learning. Alternatively, it can be defined as the act of taking in raw data and taking an action based on the category of the data. It is a collection of methods for supervised learning.

Pixel: A pixel is one of the many tiny dots that make up the representation of a picture in a computer's memory or screen.

Pixelation: In computer graphics, pixelation is an effect caused by displaying a bitmap or a section of a bitmap at such a large size that individual pixels, small single-colored square display elements that comprise the bitmap, are visible.

Simulated Annealing: Simulated annealing is an optimization method based on an analogy with the physical process of toughening alloys, such as steel, called annealing.

Serial Robot: A serial robot is a single chain of joints connected by links.

Singularity: A position in the robot's workspace where one or more joints no longer represent independent controlling variables. Commonly used to indicate a position where a particular mathematical formulation fails.

Statics: The study of forces that do not cause motion.

Velocity-Level: Mathematical formulations working with the joint speeds. Integrating the joint speeds once provides the displacements. See acceleration-level and position-level.

Workspace: The maximum reach space refers to all of the points the robot can possibly reach. The dexterous workspace is all of the possible points the robot can reach with an arbitrary orientation. The dexterous workspace is usually a subspace of the maximum reach space.

SciencePG
Science Publishing Group

This book differs from other robot vision textbooks:

- ***Its content is consisting of many implementation of mobile robot and manipulator using OpenCV.***
- ***Using newest technology in Microcontroller such as Propeller Microcontroller for robotics.***
- ***Its content is consisting of introduction and implementation of OpenCV described clearly.***

ISBN 978-1-940366-12-8

9 781940 366128 >

Price: US $99

To order additional copies of this book, please contact:
Science Publishing Group
service@sciencepublishinggroup.com
Www.sciencepublishinggroup.com