I-TE07

Soft Computing for Artificial Life robot

15:20-17:20 **Chair : Xiangfeng Feng(Oita Univ.)**
Room : C207 **Co-Chair : K. Bogunia Kubik(Oita Univ.)**

15:20 – 15:40 **I-TE07-1**

Non-parametric Density Estimation with Application to Face Tracking on Mobile Robot

Xiongfeng Feng, Zheng Wang, Masanori Sugisaka
(Oita Univ.)

The skin color model is a very important concept in face detection, face recognition and face tracking. Usually, this model is obtained by estimating a probability density function of skin color distribution. In many cases, it is assumed that the underlying density function follows a Gaussian distribution. In this paper, a new method for non-parametric estimation of the probability density function, by using feed-forward neural network, is used to estimate the underlying skin color model. By using this method, the resulting skin color model is better than the Gaussian estimation and substantially approaches the real distribution. Applications to face detection and face...

15:40 – 16:00 **I-TE07-2**

Color-based Face Detection for Alife Robot

Zheng Wang Masanori Sugisaka
(Oita Univ.)

In this paper, a skin-color model in the HSV space was developed. Based on it, face region can be separated from other parts in a image. Face can be detected by the methods of Template and eye-pair. This realized in our robot.

16:00 – 16:20 **I-TE07-3**

Graph coloring problem solving by calculations at the DNA level with operating on plasmids

T. Kubik, K. Bogunia-Kubik, and M. Sugisaka
(Oita Univ.)

In 1994 Adelman's pioneer work demonstrated that deoxyribonucleic acid (DNA) could be used as a medium for computation to solve mathematical problems. He described the use of DNA based computational approach to solve the Hamiltonian Path Problem (HPP). Since then a number of combinatorial problems have been analyzed by DNA computation approaches including, for example: Maximum Independent Set (MIS), Maximal Clique and Satisfaction (SAT) Problems. In the present paper we propose a method of solving another classic combinatorial optimization problem - the Graph Coloring Problem (GCP), using specifically designed circular DNA plasmids as a computation tool. The task of the analysis is to color the graph so that no two nodes...

16:20 – 16:40 **I-TE07-4**

Improve Digit Recognition Capability of Backpropagation Neural Networks by Enhancing Image Preprocessing Technique

Jiwu Wang (Tsinghua Univ.),
Masanori Sugisaka(Oita Univ.)

Digit recognition based on backpropagation neural networks, as an important application of pattern recognition, was attracted much attention. Although it has the advantages of parallel calculation, high error-tolerance, and learning capability, better recognition effects can only be achieved with some specific fixed format input of the digit image. Therefore, digit image preprocessing ability directly affects the accuracy of recognition. Here using Matlab software, the digit image was enhanced by resizing and neutral-rotating the extracted digit image, which improved the digit recognition capability of the backpropagation neural network under practical conditions. This method may also be helpful for recognition of other patterns with backpropagation neural networks.

16:40 – 17:00 **I-TE07-5**

Conventional versus Fuzzy Control: Performance Evaluation for Lightweight Cartesian Robot Arms

Nuttapong Jinjakam, Pitikhate Sooraksa(King Mongkut's Institute of Technology Ladkrabang)

The Proportional-Integral-Derivative control scheme is widely used in industries. This paper investigates an alternative control paradigm for controlling lightweight Cartesian robot arms. Fuzzy PI control is used and validated experimentally by comparing performance with a conventional PID control algorithm. The results show the effectiveness of the fuzzy PI control. The fuzzy control shows superior performance in transient response over the conventional one.

17:00 – 17:20 **I-TE07-6**

Self-localization from the panoramic views for autonomous mobile robots

Kang-Hyun Jo, Hyun-Deok Kang, Tae-Ho Kim(Ulsan Univ.), Inhyuk Moon(Yonsei Univ.)

This paper describes a self-localization method for the mobile robot using panoramic view images. A panoramic view image has the information of location of the objects from the viewer robot and direction between the objects at a position. Among the sequence of panoramic view images, the target objects in the image like traffic signs, facade of a building, road signs, etc. locate in the real world so that robot's position and direction deliver to localize from his view. With the previously captured panoramic images, the method calculates the distance and direction of the region of interest, corresponds the regions between the sequences, and identifies the location in the world. To obtain the region, vertical edge line segments ...