D-SA01 Intelligent System 3

09:00-11:00 **Chair : Choi Chong-Ho (Seoul National Univ.)**
Room : 4127 **Co-Chair : Cho Young-Jo (iControls)**

09:00 – 09:20 **D-SA01-1**

Identification and Control of Electro-Hydraulic Servo System Using DDV

Kim Seung Hyun, Lee Chang Don and Lee Jin Kul
(Pusan National Univ.) and Lee Sang Hoon(Hyundai Heavy Industries)

In general, for high performance pressure control system, hydraulic system with electo hydraulic servo valve controls flow rate, it contains many nonlinear term like square-root and change of bulk modulus by flow rate. But, DDV(Direct Drive Valve) contains pressure control loop itself, then it can eliminate nonlinearity and achieve linearity for hydraulic system. In this paper, parameter identification method which uses input and ouput data is applied to obtain DDV's mathematical model and parameter assuming that dynamic characteristic of DDV is first order system. Then, the state feedback controller was designed to implement the force control of hydraulic system, and the control performance was evaluated.

09:20 – 09:40 **D-SA01-2**

Implementation of Face Recognition System Using Neural Network

Jung Hun-gi and Kuc Tae-yong
(SungKyunKwan Univ.)

In this paper, we propose the face recognition system using the neural network. A difficult procedure in constructing the entire recoginition systems is the feature extraction from the face imga. And a key poing is the design of the matching function that relates the set of feature values to the appropriate face candidates. We use the length and angle values as feature values that are extracted from the face image normalized to the range of [o,1]. These features values are applied to the input layer of the neural network. Then, these multi-layered perceptron learns or gives otput result. By using the neural network we need not to design the matching function. This function may have nlonlinear attributes considerably and would be ...

09:40 – 10:00 **D-SA01-3**

Takagi-Sugeno Fuzzy Model-based Iterative Learning Control Systems: A Two-dimensional System Theory Approach

Chu Jun Uk and Lee Yun Jung
(Kyungpook National University)

This paper introduces a new approach to analysis of error convergence for a class of iterative learning control systems. First, a nonlinear plant is represented using a Takagi-Sugeno(T-S) fuzzy model. Then each iterative learning controller is designed for each linear plant in the T-S fuzzy model. From the view point of two-dimensional(2-D) system theory, we transform the proposed learning systems to a 2-D error equation, which is also established in the form of T-S fuzzy model. We analysis the error convergence in the sense of induced 2 L -norm, where the effects of disturbances and initial conditions on 2-D error are considered. The iterative learning controller design problem to guarantee the error convergence can be reduced to linear matrix inequality problems. In comparison with others, our learning algorithm ...

10:00 – 10:20 **D-SA01-4**

Performance Comparison of CEALM and NPSOL

Hong Young-Seok and Tahk Min-Jea
(KAIST)

Conventional methods to solve the nonlinear programming problem range from augmented Lagrangian methods to sequential quadratic programming (SQP) methods. NPSOL, which is a SQP code, has been widely used to solve various optimization problems but is still subject to many numerical problems such as convergence to local optima, difficulties in initialization and in handling non-smooth cost functions. Recently, many evolutionary methods have been developed for constrained optimization. Among them, CEALM (Co-Evolutionary Augmented Lagrangian Method) shows excellent performance in the following aspects: global optimization capability, low sensitivity to the initial parameter guessing, and excellent constraint handling capability due to the benefit of the augmented Lagrangian function. This algorithm is ...

10:20 – 10:40 **D-SA01-5**

Development of a Neural network for Optimization and Its Application Traveling Salesman Problem

Hong Dae Sun, Ahn Byoung Jae, Chung Won Jee(Changwon National University) and Cho Hyung Suck(KAIST)

This study proposes a neural network for solving optimization problems such as the TSP (Travelling Salesman Problem), scheduling, and line balancing. The Hopfield network has been used for solving such problems, but it frequently gives abnormal solutions or non-optimal ones. Moreover, the Hopfield network takes much time especially in solving large size problems. To overcome such disadvantages, this study adopts nodes whose outputs changes with a fixed value at every evolution. The proposed network is applied to solving a TSP, finding the shortest path for visiting all the cities, each of which is visted only once. Here, the travelling path is reflected to the energy function of the network. The proposed network evolves to globally minimize the energy function, and a ...