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Scanning the issue

K.R. Stephens, W.R. Hutchison, S.S. Hormby, and *T.M. Bell* describe in their article *Dynamic resource allocation using adaptive networks* a hybrid approach for optimal resource allocation in changing environments based on adaptive network theory, behavioral economics, decision theory, and behavior analysis. In optimal resource allocation (nonlinear optimization problem) the management of resources (manpower, time, equipment) within a process (manufacturing, training, marketing, project management) is considered in order to maximize a predefined outcome while consuming resources to process a product. A proprietary adaptive network software has been developed: BANKET^{TM} (BehavHeuristics Adaptive Network Knowledge Engineering Toolkit), currently hosted within a Smalltalk-80^{TM} environment. Different resource allocation problems have been solved using the same strategy, which has three common elements: causal modeling of the process, determining solution utility, and optimal resource allocation to the process. There are three major components to the contingencies of reinforcement and punishment governing operator behavior: antecedent stimuli (environmental events and network inputs), responses (system actions for problem solving), and consequent stimuli (feedback sources involving a utility function). Several applications, which have been developed with the use of BANKET^{TM}, are briefly described. The AMT (Airline Marketing Tactician^{TM}) product family for Airline Revenue Management has been installed at Nationalair Canada, and is currently being evaluated by different US and international carriers. The problem solving includes in this case servicing all available high-yield seats (late-booking of business class seats), avoiding empty seats (right discount amount for early-booking), and overbooking (right amount of overbooked seats as compensation for no-shows and cancellations). Revenue Management also includes the profitability increase for hotels, rental car agencies, broadcasters, utilities, and manufacturers among others. Scheduling problems are being approached within the framework of Project Management. ANATS (Adaptive Network Aircrew Training Scheduler) is a prototype scheduler for Link Flight Simulation at CAE-Link Corporation. The system schedules air crew training for pilots, copilots, flight engineers and loadmasters. The resources are classrooms, instructors, and computer-based facilities. Other scheduling problems within the airline industry include flight, crew, maintenance, gate and slot scheduling.

E. Schöneburg describes his on-going work in the area of adaptive time series analysis in his article *Stock price prediction using neural networks, A project report.* Real data from different stock prices of German companies: BASF, COMMERZBANK, MERCEDES, and different well-known neural network models: ADALINE, MADALINE, PERCEPTRON, BACK-PROPAGATION have been analyzed in terms of their suitability for stock price prediction. On principle advantages over conventional methods: implicit recognition of data dependencies, adaptive behavior (prediction) to changing conditions, and on current practical difficulties is reported. The dependence of prediction accuracy on linearization forms, number of training cycles, and prediction time is empirically analyzed. The main goal of the reported study is on short-term rise-fall and absolute-value prediction for the next day. The best results (rise-fall prediction accuracy) for BASF, COMMERZBANK, and MERCEDES stocks are respectively as follows: 79%, 74%, 58% (ADALINE); 68%, 74%, 63% (MADALINE); 68%, 63%, 68% (PERCEPTRON). The BACK-PROPAGATION network was used for absolute-value prediction and showed an apparent time shift of almost one day with respect to the real data similar to the one shown by conventional exponential smoothing of first and second order. The simple heuristic by which slight variation from the previous day's price is recommended for the prediction of the next day's price was discovered by the neural network. Further tests currently being carried out and problems encountered are summarized.

T. Furuya summarizes in his article *Neurocomputing R&D in Japan* recent efforts in the field supported by the Japanese industry and government. He subdivides the neurocomputing work in Japan in three areas: Theories and models, applications and neurocomputers. Much of the work has been published in Japanese; the work mentioned here is almost exclusively in English. The leading work in neural network modelling by Amari, Fukushima, Nakano, and Hirai is mentioned. Recent work in theories has been done by Irie, Funahashi, Arai, Asoh (multi-layered), Abe (Hopfield), Shinomoto, Tanaka, and Aihara (others). Baba, Ishikawa, and Yamada have worked in learning theory. Kawato, Akiyama, Tsutsumi, Doya, and Furuya have contributed with models. In the area of applications work especially in pattern recognition: Speech and image, is summarized. In speech recognition Iso (NEC), Matsuoka (NTT), Shikano (ATR), and Amaro (Hitachi) have proposed neural methods. In image recognition the proposals by Omori, Hosokawa, Uchiyama (NTT), and Yamada (NEC) have been relevant. Work in other areas done by Hiramatsu (NTT), Matsuda (Tokyo Electric Power Company), Akiyama (Keio University), and Iwata (Nagoya Institute of Technology) is also mentioned. T. Furuya subdivides the area of neurocomputers in: Neurochips, neurocomputers, commercial and optical neurocomputers. Neurochips in digital or analog VLSI technology have been fabricated by Keio University, Fujitsu, Hitachi, and the University of Tsukuba. Neurocomputers (hardware simulators) were designed by NEC (NeuMan), Nagoya Institute of Technology, SONY, and Fujitsu. Commercial neurocomputers available in the market are from NEC, Fujitsu, and Nippon Steel Corporation. Optical neurocomputers are from Industrial Products Research Institute, NTT, and Mitsubishi. At the end two government R&D projects are briefly described: the Human Frontier Science Program (HFSP) and the Research and Development Association for Future Electron Devices (FED).

H. Kappen and *C. Gielen* give an overview of the *Neurocomputing research in The Netherlands* in their article. A new research program on neural networks with emphasis on sensory and motor systems, which has been launched to start in January 1990, is described. Funding of Mfl. 2.5/year is sponsored by the Dutch Ministry of Economics, the Dutch industry and academia. H. Kappen and C. Gielen act respectively as program manager and director. Academia is organized mainly in the Foundation for Neural Networks (SNN). Universities currently participating in the program are: Leiden (cognition), Amsterdam (robotics), Utrecht (3-D vision and audition) and Nijmegen (audition, sensor fusion, motor control, and computer science). Companies participating have a broad background: BSO, VOLMAC, DEC (software applications); ARCOBEL/PARSYTEC, HP, PHILIPS/Paris (hardware, VLSI implementations), SHELL, DEC (new algorithms and theory for own applications). The SNN research activities are subdivided in: Information storage and retrieval, sensory information processing, and movement coordination. Three other research activities on neurocomputing not coordinated by SNN are mentioned: one in VLSI implementations at the Universities of Eindhoven, Delft and Twente. Another one on combinatorial optimization at Philips Research Labs. The third one at the University of Groningen on adaptive visual strategies and recurrent pattern recognition.

R.C. Johnson summarizes in his article *IJCNN-WASH-DC-90* the winter meeting of the 1990 International Conference on Neural Networks held in Washington DC on January 15 – 19. Government sponsored projects around the world to develop neurocomputing technology were described at a panel chaired by H. Szu. The largest investments are being sponsored by the Japanese government. The funded projects deal with neural and other biologically inspired technologies. The Human Frontier Science Program (HFSP) is committed with $18 – 24 Mio/year from 1989 to 2009; the Riken Frontier Science Program is funded with $3 Mio/year for 15 years; a separate brain function program is funded with $0.5 Mio/year for 3 years. Two biodevices programs will run for 10 years with $2.5 Mio/year and for 3 years with $2 Mio/year. A smaller program is funded with $0.2 Mio/year. The new Japan Neural Network Society (JNNS) has been established. It has about 450 members and its first president is Professor K. Fukushima, a member of our editorial board. The US government support for development of neurocomputing technology is focused to the defense area by agencies like the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), the Defense Communications Agency (DCA), the Navy, the Air Force, the Army, and the Marines. US nondefense funding includes sponsoring by the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), the National Institute of Health (NIH), the Post Office, the Treasury Department and the Department of Energy. The sponsored projects by the European Community as a whole and by some individual european countries were also summarized. The projects PYGMALION (two years) and ANNIE (three years) are funded by ESPRIT II (European Strategic Program for Information Technology). Additional funding has been made available by the EC for basic research projects.

V. David Sánchez A.
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