

# THE 1994 IEEE INTERNATIONAL CONFERENCE ON NEURAL NETWORKS

---

## IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE

June 27 - June 29, 1994

Walt Disney World Dolphin Hotel  
Orlando, Florida

---



IEEE  
NEURAL  
NETWORKS  
COUNCIL



Volume V  
Pages 2715-3436

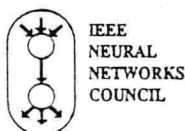
# THE 1994 IEEE INTERNATIONAL CONFERENCE ON NEURAL NETWORKS

---

## IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE

June 27 - June 29, 1994

Walt Disney World Dolphin Hotel  
Orlando, Florida



---

Volume V  
Page 2715-3436

江苏工业学院图书馆  
藏书章

## The 1994 IEEE International Conference on Neural Networks

Copyright and Reprint Permission: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. Instructors are permitted to photocopy isolated articles for non-commercial classroom use without fee. For other copying, reprint, or republication permission, write to IEEE Copyright Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. All rights reserved. Copyright 1994 for the Institute of Electrical and Electronics Engineers, Inc.

IEEE Catalog Number: 94CH3429-8

ISBN Softbound: 0-7803-1901-x

Casebound: 0-7803-1902-8

Microfiche: 0-7803-1903-6

Library of Congress Number: 94-75611

Additional copies of this publication are available from

IEEE Service Center

445 Hoes Lane

P.O. Box 1331

Piscataway, NJ 08855-1331

1-800-678-IEEE

- Abaye, A. 3393  
 Abbas, Hazem M. 101  
 Abbey, J. 802  
 Abel, C. 1842  
 Abellard, P. 3375  
 Abiev, R. 1644  
 Abraham-Fuchs, K. 467  
 Abusland, A. 1860  
 Acevedo-Soto, Isabel 1525  
 Acosta, L. 4583  
 Adelsberger-Mangan, D. 2245  
 Adjei, O. 3156  
 Adkins, K. 1871  
 Adler, M. 4288  
 Agrawal, A. 11777  
 Ahalt, S. 1871  
 Ahmad, J. 3667  
 Ahn, Jesusung 692  
 Aitken, A. 823  
 Akano, S. 275  
 Akamatsu, Norio 540  
 Akers, L. 1821  
 Akima, Yoshinao 3067  
 Albert, S. 3530  
 Albesano, Dario 4400  
 Albright, J. 498  
 Albuquerque, A. 3900  
 Alder, M. 616.3184, 4259  
 Aleksander, I.  
 Alguindigue, Dr. Isreal 3312  
 Alicata, F. 2264, 2272  
 Aliev, R.A. 1644  
 Aliev, R.R. 1644  
 Alippi, C. 4571  
 Alix, Dr. D. 452  
 Allen, F. 1291  
 Almeida, L. 66  
 Alpsan, D. 3512  
 Alpsan, Dr. Doghan 567  
 Aman, S. 787, 1159  
 Amoozgar, Farid 3932  
 An, P.E. 2465  
 Anderson, T. 4466, 4502  
 Andreou, A. 1903  
 Andrew, L. 4159  
 Angeniol, B. 3587  
 Ansari, N. 1777, 3577, 4699  
 Antsaklis, P.  
 Anzai, Y. 125, 868  
 Aourid, M. 4645  
 Arau, F. 3770  
 Aravindan, P. 725  
 Arcand, J. 1519  
 Arena, P.  
 Arisawa, M. 155, 3686  
 Armutage, W. 336  
 Arreguit, X. 1883  
 Arseneau, J. Brant 3888  
 Arulambalam, A. 3577  
 Asano, N. 4333  
 Asanovic, K.  
 Ashenayi, K. 3461  
 Askew, C. 2616  
 Aslam-Mir, S. 2465  
 Asogawa, Shizuo 540  
 Asoh, H. 275  
 Atiya, Amir 1454  
 Atkins, Stephen-2673  
 Atsumu, Yoshihiro 3800  
 Auda, G. 1301  
 Augusteijn, Manjke F. 2726, 4300  
 Aussem, Alex 2482  
 Autret, Y. 2679  
 Awata, M. 1929  
 Ayala, G.F. 2264, 2272  
 Azimi-Sadjadi, M. 3277, 4084, 4321, 4327  
 Baba, N. 1340, 2690  
 Baba, Norio 811  
 Babu, G. 4661, 4672  
 Bachauskene, M. 2938  
 Badgero, M. 3986  
 Bae, Byeong 2639  
 Bae, J. 3431  
 Baginski, B. 2732  
 Bahrami, Mohammad 2655  
 Baird, L. 2448  
 Baker, Walter 2673  
 Baldanza, C. 3790  
 Balkarey, Yuri I. 4370  
 Balkin, T. 3521  
 Ballard, D. 4409  
 Balmat, J.F. 3375  
 Baiwinski, S. 3521  
 Bandler, W. 4487  
 Bang, S. 1923, 2046, 3369  
 Baozong, Y. 4133  
 Baram, Y. 4175  
 Barhen, J. 2869, 4592  
 Barranco, B. 1912  
 Barro, S. 3938  
 Bartal, Yair 3744  
 Bartana, I. 1987  
 Bartezak, A. 2103  
 Bartai, G. 940  
 Baskomurcu, G. 1103  
 Bass, E. 2555, 2524  
 Bastani, F. 521  
 Bastian, A. 3256  
 Batut, C. 2605  
 Bauknecht, H. 719  
 Baum, C.  
 Bayer, H. 719  
 Bayoumi, M. 4750  
 Bayoumi, Mohamed M. 101  
 Bazoon, M. 3525  
 Beck, J.  
 Behun, B. 3222  
 Belyuk, G. 521  
 Benitez-Diaz, D. 1415  
 Benvenuto, N. 309  
 Beom, H. 2709  
 Berger, M. 4514  
 Berger, T. 2009  
 Bergman, L. 2938  
 Bernard, G. 3655  
 Bersini, H. 1307, 2476  
 Bertels, K. 1381  
 Bernhold, M. 4470  
 Bhadkamkar, N. 1866  
 Bhat, N. 2389  
 Bhavsar, Virendra 1409  
 Bi, Guangguo 622  
 Bi, Hao 622  
 Bibyk, S. 1842, 1871  
 Bieszczad, A. 1313  
 Bigus, Joseph 2442  
 Billakanta, S.R. 3507  
 Birn, E. 3750  
 Bing, G. 2530  
 Bingxian, H. 1181  
 Birnmeier, M. 3921  
 Bisi, F. 3790  
 Bisset, D. 4349  
 Bisset, D.L. 1386, 1465  
 Bitner, D. 175  
 Bjorn, 1186  
 Blackman, D. 1830  
 Bluff, K. 1749  
 Bogdan, M. 1959  
 Bondarenko, V.E. 1018  
 Bonner, R. 3461  
 Boonyanit, Kan 28  
 Boram, Y. 3032  
 Bose, N.K. 239  
 Bourbakis, N. 2803  
 Bouzardoum, A. 918  
 Boyd, J. 2175  
 Branca, A. 4359  
 Branco, A. 3846  
 Branston, N.M. 477  
 Brattoli, M. 3846, 4359  
 Bremont, J. 2233  
 Bright, V. 2250  
 Brockmann, W. 1607  
 Brown, G. 2291  
 Brown, M. 1335, 2465  
 Brown, R. 3222, 3693  
 Brunet, P. 4473  
 Bruschini, C. 790  
 Buck, J. 2389  
 Buesher, K.  
 Bugmann, G. 2239  
 Burel, G. 2948  
 Burke, H. 2213  
 Burkhardt, D. 3156  
 Buttarazzi, B. 4061  
 Cabrera, S. 299  
 Caelli, T. 4033  
 Cagnoni, S. 762  
 Cahay, Marc 2089  
 Cai, Y. 3116  
 Campbell, S. 964  
 Card, H. 1889, 2004  
 Carmona, R. 1877  
 Carothers, J. 1939, 4676  
 Carpenter, G.  
 Carrabina, J. 1415  
 Carson, J. 1907  
 Carvalho, A. 4349  
 Casselman, F. 3409  
 Castanie, F. 395  
 Catfolis, T. 3238  
 Caudell, T. 1235  
 Caulfield, H. 1291  
 Celebi, S. 4497  
 Chae, H. 2596  
 Chahande, A. 13507  
 Chak, C.K. 2854  
 Chakravarthy, S. 897  
 Challoor, R. 1654  
 Challoor, Rajab 4028  
 Chan, K. 681  
 Chan, L. 290, 1674, 2058  
 Chan, M. 4483  
 Chan, W. 290  
 Chandrasekaran, V. 4033  
 Chang, B. 3499  
 Chang, F. 2592  
 Chang, Gao-Wei 1943  
 Chang, J. 1056  
 Chang, P. 3605  
 Chang, R. 3369, 3381  
 Chang, Ray-I 4123  
 Chang, W. 4163  
 Charalambous, Chris 3629  
 Chantout, Andreas 3629  
 Charison, E. 3499  
 Chatterjee, C. 4095  
 Chellappa, R. 4022  
 Chen, B.Y. 3862  
 Chen, C. 1175, 2592  
 Chen, C.H. 1199  
 Chen, C.Y. 3078  
 Chen, Caisheng 2108  
 Chen, Carl 4613  
 Chen, CL. Philip 781  
 Chen, D. 4072  
 Chen, E-Liang 13104  
 Chen, H. 3641  
 Chen, O. 817, 2009  
 Chen, Pi-Fuay 2842  
 Chen, Qiyang 1169  
 Chen, W. 4597  
 Chen, Y. 107  
 Chen, Z. 2512  
 Chen, Zhong-Yu 1022, 1068  
 Cheng, Chih-Cheng 850  
 Cheng, G. 649  
 Cheng, Hui 425  
 Cheng, L. V-3982  
 Cheng, L.M. 1546, 4038  
 Cheng, Y. 797, 4635  
 Cherruel, G. 2679  
 Chesmore, E. 3307  
 Cheung, J. 1175, 930  
 Chhabra, A. 3774  
 Chiang, C. 1-119  
 Chiu, C. 333  
 Chiu, Chi-Tien 3662  
 Cho, H. 2709  
 Cho, S. 2881  
 Cho, Seongwon 692  
 Cho, Yoo-Kun 4283  
 Choi, J. 1226  
 Choi, Jin 1359  
 Choi, T. 4724  
 Choong, P. 1438, 3516  
 Chow, C. 431  
 Chow, Ching-Hua 3505  
 Chow, Mo-yuen 600  
 Christodoulou, C. 2239  
 Chu, C. 431  
 Chu, G. 3342  
 Chua, L.O. 1917  
 Chung, C. 675  
 Chung, F. 1595, 4597  
 Chung, Pau-Choo 1092, 3104  
 Cios, K. 2185  
 Clancie, E. 3326  
 Clark, D. 1654  
 Clarke, L. 3437  
 Clarkson, T. 2239  
 Clemens, Laura E. 4300  
 Clifton, D. 1121  
 Cloete, I. 295  
 Codrington, C. 339  
 Codrington, C. 555, 72  
 Codrington, Craig W. 736  
 Coetzee, F. 453  
 Coghill, G. 714, 4640  
 Cohen, Dr. Alex 4370  
 Colak, S. 1885, 1955  
 Colina-Morles, E. 2494  
 Concepcion, V.  
 Condarcure, T. 2684  
 Conde, T. 3552  
 Constantunides, A.G. 4553  
 Convertino, G. 3846, 4359  
 Cooper, J. 2166  
 Coowanitwong, Vasana 251  
 Coronado, J. 2848, 4012  
 Corral, Juan 4113  
 Corredera, J. 4588  
 Costa, M. 2901, 4232

# Authors Index

- Cotta-Ramusino, A. 3790  
 Creany, M. 4431  
 Crestani, Fabio 3426  
 Crucianu, M. 4405  
 Cruz, Jr., Jose 3806  
 Cuevas, W. 483  
 Cuffaro, A. 1115  
 Cui, C. 3342, 3525  
 D'Antone, I. 3790  
 da Rocha, Armando 1571  
 Dagher, Issam 1626  
 Dagli, D. 3184  
 Dahanayake, B.W. 572  
 Daly, J. 2103  
 Darnell, M. 3307  
 Darwish, A. 856  
 Das, R. 2308  
 Das, S. 2308  
 Das, Sanjoy 4623  
 Dasgupta, S. 113  
 Daud, T. 1907  
 Daugherty, Kim 2303  
 Davies, E.R. 4316  
 Davis, E.R. 4265  
 Dayhoff, J. 1273  
 de Carvalho, L. 3738  
 de Faria Leao, Beatriz 1726  
 de Oliveira, E. 3900  
 de Padua Braga, A.  
 de Wet, A. 2209  
 De-wen, Hu 2793  
 DeAngelis, C. 1213  
 Decaestecker, C. 263  
 Declercq, Michel 2064  
 Deco, G. 686  
 deFigueiredo, R. 2922  
 Deiss, S. 1217  
 Del Boca, Adrian 3098  
 Delgado-Frias, J. 1397, 4518, 4523  
 Delgado-Frias, Jose G. 2078  
 Delgado-Restituto, M. 1993  
 Delgado-Restituto, M. 3973  
 Delopoulos, A. 4055  
 Demura, K. 125, 868  
 Denzler, J. 4457  
 Der, R. 645  
 Der, R. 2472  
 Deredy, W. El 477  
 deSilva, C. 1438, 3516, 4259  
 Dhawan, A. 641  
 Dhawan, Atam 3352, 3872  
 DiDomenico, E. 2556  
 Dietrich, E. 2339  
 Dillon, T. 1600  
 Dinstein, I. 3472, 3540  
 Distant, A.-3846, 4359  
 Dlay, S. 2122  
 Doermann, D. 4022  
 Dolenko, B. 1889  
 Dominguez, R. 1877  
 Donald, J. 1821  
 Dong, L. 1542  
 Dong, W. 464, 3271  
 Donham, C. 1830, 1836  
 Donne, J. 2327  
 Dongio, M. 887  
 Douglas, R. 1848  
 Drouhard, JeanPierre 4294  
 Du, J. 181  
 Duong, T. 1907  
 Dupont, F. 2679  
 Durand, S. 2321  
 Edmonds, A. IV-3156  
 Edwards, T. 1903  
 Eis, K. 4327  
 El-Hawary, M. 2361, 4730  
 El-Jaroudi, A. 360  
 El-Kabbany, G. 1695  
 El-Sattar, A.A. 2545  
 El-Shafii, M. 2550  
 El-Sharkawi, M. 3724  
 Eldracher, M. 2732  
 Eldredge, James 2097  
 Elias, John 2028  
 Elinson, Mordukh I. 4370  
 ElMaraghy, H. 12765  
 Elmasry, M.I. 517, 4479  
 Elmastry, M.I. 401  
 Elshent, H. 535  
 Elsimary, H. 856  
 Eltoft, T. 2922  
 Elwasif, W. 3398  
 Englisch, H. 3170  
 Enokihara, M. 2415  
 Erdem, M. 1103, 1130  
 Erten, G. 4746  
 Espejo, S. 1877  
 Estevez, P. 1783  
 Etamad, K. 4022, 4415  
 Eihan Cheng, Y. 903  
 Etienne-Cummings, R. 1830, 1836  
 Eixebarría, Victor 2562  
 Eun, Changsoo 3582  
 Evans, M. 2837  
 Everett, D. 3592  
 Evtkhov, Micheal G. 4370  
 Fairhurst, M. 4349  
 Fairhurst, M.C. 1386  
 Fakhr, W. 401  
 Falas, Tasos -3629  
 Fan, J. 1619, 3601, 4269  
 Fan, L.T. 3137  
 Fang, W. 366  
 Farrokhi, M. 413  
 Fatmi, H. 3667  
 Faulkner, V.W. 3507  
 Fausett, L. 3398  
 Fechner, T. 3915  
 Feldkamp, L. 2377  
 Feldkamp, L. 2488  
 Feldman, J.  
 Fellman, R. 2297  
 Fellrath, P. 1818  
 Feltham, R. 3546, 4090  
 Feng, Dr. Geng 2854  
 Feng, X. 3693, 4483  
 Fernando, S. 1830  
 Feroz, Ehsan 425  
 Feuring, Th. 1686  
 Fiala, John C. 2759  
 Fiez, T. 1842  
 Figueras, Anthony 4613  
 Fijany, A. 4592  
 Filho, A. 996  
 Filippi, E. 2901, 4232  
 Firenze, Fedenco 653  
 Firmin, C. 2985  
 Fischer, G. 2074  
 Fischl, R. 3719  
 Fisher, J. 12934  
 Fisher, W. 1191  
 Fitzpatrick, T. 3530  
 Flachs, B. 1098  
 Fletcher, J. 204  
 Flotzinger, D. 2890, 3448  
 Flynn, M. 1098  
 Fomin, T. 731, 2282, 2777, 4380  
 Fong, H. 4353  
 Fortuna, L.  
 Fowler, J. 1871  
 Francelin, R. 4508  
 Franquelo, L. 2040  
 Freeman, D. 3409  
 Fu, H. 119  
 Fu, L. 1484  
 Fu, LiMin 1550, 1793  
 Fuente, A. 4588  
 Fujii, M. 4210  
 Fujii, T. 3216  
 Fukuda, T. 1566, 3770  
 Fukumi, M. 4390  
 Fukumizu, Kenji 777  
 Fulkerson, B. 3134  
 Fummi, F. 4571  
 Furuya, T. 3122  
 Gader, P. V-4006  
 Gaio, Mauro 1658  
 Gaitanis, N. 3866  
 Galan, R. 2203, 2661  
 Galitsky, B. 2268  
 Galvan, J. 2643, 3226  
 Ganapathy, V. 3646  
 Garga, A.K. 239  
 Gargano, M. 3634  
 Gans, H. 1714  
 Gaitanis, N. 3866  
 Gasos, J. 3256  
 Gassen, D. 1939  
 Gaudiano, P. 2848  
 Gegout, C. 546  
 Gelenbe, E. 4681  
 Gelenbe, R. 3996  
 Gelfand, S. 555  
 Gelli, Kiran 4028  
 Gemelio, Roberto 4400  
 Georgopoulos, M. 1222, 2137  
 Georgopoulos, Michael 756  
 Geva, S. 2419  
 Ghista, D.N. 567  
 Ghorbani, Ali A. 1409  
 Ghosal, S. 3816  
 Ghosh, J. 897  
 Gibson, G. 912  
 Giles, C. 1267  
 Giles, C.L. 1732  
 Gilkey, R. 4502  
 Girod, J. 2233  
 Glazos, M. 4547  
 Giesner, M. 407, 1589, 1804  
 Godbout, Mario 4294  
 Goel, S. 4198  
 Goh, Anthony 3322  
 Gohara, K. 980  
 Golden, Bruce L. 4535  
 Goldenberg, A. 2737  
 Gomez-Ramirez, E. 2112  
 Gomide, F. 4508  
 Gonzalez-Rodriguez, M. 1415  
 Goode, Paul 44  
 Goodman, P. 2213  
 Goodman, R. 193  
 Gopalsamy, K. 976  
 Gorgui-Naguib, R. V4431  
 Gornevsky, D. 2574, 2737  
 Gouhara, K. 4333  
 Govind, R. 4635  
 Graettinger, T. 2389  
 Graine, S. 845  
 Graves, S. 4337  
 Graziani, S.  
 Green, R. 1213  
 Greenberg, S. 4216  
 Greenough, Mike 606  
 Gresser, J. 704  
 Grigoriu, T. 1115  
 Grim, P. 2174  
 Groen, F. 2787  
 Guazzelli, Alex 1726  
 Guerrero, Miguel 4113  
 Guest, C. 1263  
 Gulati, S. 2869  
 Gunther, Holger 3094  
 Gunzinger, A. 3961  
 Gupta, M. 175, 11443  
 Gupta, M.M. 2518  
 Gurta, N. 4309  
 Gur, M. 2991  
 Guterman, H. 3472, 3540, 4216  
 Guzman, R. 483  
 Gyuresik, R. 1364  
 Haft, M. 467  
 Hagihara, Masafumi 1062, 1080  
 Haikonen, P. 746  
 Hagmuge, S. 407, 1589  
 Hamad, D. 2985  
 Hamaiaianen, Ari 659  
 Hambaba, M. 535, 2179  
 Hameenanta, T. 4676  
 Hamilton, A. 4583  
 Hammel, Sherry 3178  
 Han, I. 3978  
 Han, M. 742, 4650  
 Hanagandi, V.  
 Handa, H. 2690  
 Handler, T. 3056  
 Hang, ChangChieh 38  
 Hannah, I. 4265, 4316  
 Hao, Jianbin 3250  
 Haque, A. 1175, 930  
 Hara, K. 2997  
 Hara, V. 2667  
 Harauz, G. 3525  
 Hare, Mary 2303  
 Haroun, B. 2859  
 Harris, C.J. 1335, 2465  
 Harris, J. 1894  
 Hasegawa, Y. 1566  
 Hashem, S. 1507  
 Hashida, M. 2415  
 Hassoun, M. 1247  
 Hassoun, M. 3761  
 Hatano, H. 3122  
 Hatano, S. 3122  
 Hatton, Motonobu 1062, 1080  
 Hawley, John 3894  
 He, Yongbao 1632  
 Healy, M. 1235  
 Hegazi, N. 1695  
 Hegt, H. 1885  
 Hegt, Hans 1955  
 Heileman, G. 1222  
 Heileman, Gregory 756  
 Heinen, J. 4483  
 Heinz, A. 1755  
 Heit, B. 2233  
 Hemminger, T. 3003  
 Herrmann, M. 2472  
 Heskes, T. 508  
 Heywood, M. 489  
 Hidalgo, H. 3387  
 Hiernstra, Y. 3170  
 Higasa, Hiromasa 2649  
 Hillion, A. 3452  
 Himmelblau, David M. 3244  
 Hiramatsu, A. 3611

# Authors Index

- Hirose, A. 3173  
Hirose, Ryan 1963  
Ho, C.S. 2137  
Ho, F. 437  
Ho Park, J. 4724  
Hoang, D. 1560  
Hochet, Bertrand 2064  
Hodjar, Babak 2333  
Hoen, K. 1854  
Holden, S. 327  
Holler, M. 1186  
Honda, Takashi 3154  
Hong, S. 2500  
Hong, X. 3403  
Hong Suh, I. 2781  
Hongo, S.  
Home, B. 1267  
Hosomi, A. 275  
Hou, E. 1777  
Houck, M. 3261  
Houstis, E. 2197  
Howells, G. 1386  
Howitt, I. 3571  
Hoyt, J. 4493  
Hruska, S. 1484, 1487  
Hrycej, Tomas 2962  
Hsia, T. 3571  
Hsiao, P. 3381  
Hsiao, Pei-Yung 4123  
Hsu, Hui-huang 1793  
Hu, C. 3020  
Hu, J. 4693  
Hu, Y. 2297, 461  
Huang, Juxin 756  
Huang, Kou-Yuan 561, 1650  
Huang, S. 3724  
Huang, T.H. 578  
Huertas, J. 1912  
Hui, S. 4547  
Hulme, C. 2291  
Hummeis, D. 3050  
Humpert, B. 470  
Hung, H. 627  
Hung, Y.S. 960  
Hurst, R. 3461  
Hutchings, Brad 2097  
Hwang, Boon C. 2580  
Hwang, C.J. 3078  
Hwang, D. 742  
Hwang, Hee-Yeung 4283, 4306  
Hwang, Heeyeung 692  
Hwang, J. 1222, 1325, 4066  
Hyland, P. 2291  
Hylander, P. 1825  
Ibrahim, A. 4321  
Ichiba, Hideo 3800  
Ichimura, T. 3534  
Ide, T. 2367  
Idesawa, M. 2309  
Iijima, Nobukazu 1529  
Ikeda, K. 1159  
Ikonomopoulos, A. 3703  
Imai, K. V3909  
Innocenti, M. 3796  
Inoue, N. 1743  
Inoue, T. 3956  
Ioannou, P. 3363  
Irwin, G. 2429  
Ishibuchi, Hisao 2907, 3457  
Ishida, Y. 4448  
Ishida, Yoshihisa 3154  
Ishigame, A. 4704  
Ishigami, H. 1566  
Ishii, K. 3216  
Ishii, N. 1537  
Ishikawa, M. 354, 1810  
Isik, C. 413  
Ismail, M. 1842  
Isotani, Sadao 3900  
Israel, P. 1721  
Iwahori, Y. 1537  
Iyengar, S. 4623  
Jagannathan, S. 2831, 2837, 4766  
Jagota, A. 1044  
Jain, A. 4374  
Jain, Anil K. 2967  
Jain, R. 4072  
Jakubowicz, O. 4247  
Janer, C. 2040  
Janko, J. 4502  
Jaramillo-Moran, Miguel 1525  
Jean, J. 4198  
Jegannathan, S. 4154  
Jeon, Gi 2639  
Jeon, J. 2596  
Jeong, Hong 4442  
Jimenez, A. 2203, 2661  
Jin, L. 1443  
Jin'no, K. 992  
Johnson, J. 1279  
Johnson, Walter H. 4370  
Jones, R. 722-0  
Jones, S. 1969, 3840  
Jones, T. 1560, 4006  
Jorgensen, C.  
Joshi, A. 2197  
Joutsenalo, J. 637  
Jumper, E. 441  
Junbo, F. 1619, 4269  
Justice, S. 1842  
Kabirsky, M. 2250  
Kadono, T. 4243  
Kahla, M. 395  
Kahles, B. 4457  
Kajitara, M. 125, 868  
Kakazu, Y. 1498, 3877  
Kaiman, B. 167  
Kaimar, Zs. 1815  
Kalouptidis, N. 2911  
Kamata, H. 4448  
Kamei, M. 401, 437, 517, 1301  
Kamimura, R. 143  
Kamimura, Ryotaro 588, 594  
Kaminska, B. 4645  
Kanaya, M. 1929  
Kandil, S. 2550  
Kane, J. 1987  
Kane, R. 3190  
Kappel, G. 3905  
Karayannis, N. 1577  
Karayannis, Nicolaos 32  
Karhunen, J. 1241  
Karjala, Thomas W. 3244  
Karras, D. 285, 3866  
Karu, K. 4374  
Kaski, K. 1149  
Kato, T. 4237  
Katsumata, Kouichi 3154  
Kawada, Masatake 1529  
Kawamoto, M. 221  
Kawamoto, S. 4704  
Kawanabe, M. 787  
Kaylani, T. 113  
Kaznatchey, D. 1044  
Keller, I. 3915  
Keller, J. 4006  
Kellmeyer, I.L. David 4226  
Kemeny, S. 1907  
Ker, Jar-Shone 1943  
Kerrigan, D. 3409  
Kersten, D. 4343  
Kertesz, Attila 4145  
Kertesz, V. V4145  
Ketler, W. 3336  
Khalid, M. 2599  
Kharouf, P. 3693  
Khorasani, K. 1115, 1403, 2956  
Khoshgoftaar, Taghi 3295  
Khotanzad, A. 3393  
Khunasaraphan, C. 1513  
Kia, S. 714  
Kiessing, A. 4457  
Kil, Rhee 1359  
Kim, Chong Sang 692  
Kim, D. 4650  
Kim, Dong-Kyu 4283  
Kim, H. 903  
Kim, Hyeoncheol 1550  
Kim, I. 4755  
Kim, I. 2084  
Kim, J. VI-4755  
Kim, J. 1427, 2535, 2596, 2709, 4220, 4559  
Kim, J.H. 907  
Kim, Jinsung 1787  
Kim, Jongwan 692  
Kim, S. 951, 2500, 2885  
Kimura, Y. 149, 3852  
King, F. 3950  
Kinet, P. 1899, 1949  
Kinouchi, Y. 2407  
Kirschening, I. 4437  
Kita, H. 1319, 2254, 2813  
Kitagawa, H. 4619  
Kitamura, M. 3207  
Klauber, B. 2052  
Koch, M. 2979  
Koczy, L.  
Koffi, R. 4044  
Koh, K. 2709  
Kolen, J. 1375  
Kollias, S. 4055  
Kollun, S. 2149  
Komoda, A. 508  
Kompe, R. 4457  
Kondo, K. 4448  
Konig, A. 1804  
Konstenius, J. 3671  
Kormos, D. 4017  
Kosanovich, K.  
Kotani, Ravi 2089  
Kotsas, P. 4017  
Koutroubas, K. 2911  
Kovacs, I. 2282  
Kowaczuk, A. 3038  
Kozma, R. 3207  
Kremer, Martin 3872  
Kreinovich, V. 299  
Kremer, Stefan 3015  
Krishnamoorthy, A. 1998  
Kruze, Rudolf 1638  
Krzyzak, Adam 1209  
Ku, C. 4724  
Kumara, S. 1532  
Kumthekar, B. 3143  
Kuncicky, D. 1481, 1484  
Kuntmad, G. 1285  
Kuo, J. 3131  
Kuo, J.B. 3862  
Kuo, R. 11532  
Kuo, Yau-Hwang 1943  
Kurita, T. 275  
Kuroe, Y. 2819  
Kwok, T. 198  
Kwon, Hee-Yong 4306  
Kwon, Taek 425  
Kwong, Chung-Ping 1068  
Kwoon, Y. 4220  
Lacaille, J. 924  
Lacher, R. 366  
Lacher, R.C. 1766  
LAI, W.K. 4640  
Lainionis, D. 2344, 4710, 4736  
Lam, K. 4607  
Lam, K.P. 2143  
Lam, S. 960  
Lampinen, J. 3812  
Lande, T. 1860  
Lane, S. 3409  
Lang, S. 3301  
Lange, J. 1355  
Lau, S. 4384  
Lay, S. 1325  
Le, Daniel X. 3009  
Le Chiara, Giuseppe 2952  
LeBot, Dr. C. 3452  
Lee, A. 3982  
Lee, Alex W.H. 4038  
Lee, Bong-Kyu 4283  
Lee, C. 1-675, 4650  
Lee, H. 2191  
Lee, Hahn-Ming 1583  
Lee, Heong-Ho 4283  
Lee, Heung-Ho 4306  
Lee, J. 2500  
Lee, Jyh-Ping 1137  
Lee, K. 2355, 2524, 2568, 3490, 4724  
Lee, Kun Chang 1787  
Lee, S. 2411, 2423, 2696  
Lee, S. 2535, 3088  
Lee, T. 1595, 4597  
LEE, Y. 956  
Lee, Y. 986  
Leepnapreeda, T. 2605  
Leemik, L. 1267  
Leiss, E. 107  
Leopold, Jurgen 3094  
Lera, G. 2643  
Lerner, B. 3472, 3540  
Leung, S. 892  
Levine, D. 2172  
Levinstein, M. 3472  
Levy, William 2245  
Lewis, F. 2539, 4766  
Lewis, J. 2797  
Li, Fu 88, 1680  
Li, Q. 708  
Li, S. 107  
Li, X. 2153, 2454  
Liang, F. 2765  
Liang, P. 3110  
Liang, X. 181  
Liano, K. 513  
Lie, T. 1760, 2916  
Lightbody, G. 2429  
Liljenstrom, H. 970  
Lim, G. 4259  
Lin, C. 360, 419, 797, 903  
Lin, Genghis 3201  
Lin, J. 1056  
Lin, J.N. 1668  
Lin, Jie 3744  
Lin, Senmao 2108  
Lin, T. 1267  
Lin, W. 627, 4518, 4523

# Authors Index

- Ling, Bo 3834  
 Liou, J.J. 2137  
 Liou, R. 3277, 4327  
 Lippe, W.-M. 1686  
 Lister, R. 84  
 Liu, B. 2400  
 Liu, Bin-Da 1943  
 Liu, W. 1056  
 Liu, X. 22, 649  
 Liu, Ying 4139  
 Liu, Yu-cheng 1109  
 Lo, J. 1-836, 2074, 2149  
 Ioh, N. 526  
 Lohiser, B. 1842  
 Long, Y. 4750  
 Lont, J. 350  
 Lopez, L. 2749  
 Lopez-Aligue, Francisco 1525  
 Lonnitz, A. 671, 731, 1815, 2282, 2777, 4380  
 Love, James 3283  
 Low, K. 4384  
 Lowe, D. 1197, 3623  
 Lu, B. 1319  
 Lu, Bing-Hui 1583  
 Lu, G. 4761  
 Lu, W. 3828  
 Lucking, W. 3307  
 Ludeman, L. 4078  
 Ludik, J. 295  
 Ludwig, D. 1907  
 Luebbens, P. 4278  
 Lui, H. 4220, 4384  
 Luik, Alexander 376  
 Luk, A. 892  
 Luo, Jiyang 781  
 Luo, R. 2703  
 Lure, F. 4180  
 Lursinap, C. 279  
 Lursinap, C. 1513  
 Lursinap, Chidchanok 251  
 Ly, S. 1226  
 Machado, Ricardo 1571  
 MacMillan, J. 4571  
 Madarasu, S. 4343  
 Madelaine, Jacques 1658  
 Madsen, Per Printz 4541  
 Maekawa, S. 1050, 2813  
 Magley, D. 3409  
 Mah, R. ???-0  
 Mahoney, B. 2173  
 Mahowald, M. 1848  
 Maifret, R. 3375  
 Maillard, E. 704, 766, 1772  
 Malakooti, B. 665  
 Malferran, L. 3790  
 Malmqvist, K. 2938  
 Mana, Franco 4400  
 Mandel, J. 3816  
 Manduca, A. 3990  
 Mange, D. 2321  
 Mansour, M. 2545, 2550  
 Mao, Jianchang 2967  
 Mao, M.W. 3862  
 Mao, Yimin 622  
 Mararukulam, D. 3393  
 Marcade, E. 3587  
 Marchal, P. 2321  
 Marczell, Zs. 2282  
 Manno, M. 2661  
 Martin, C. 305  
 Martin, G. 2233  
 Martin, K. 1848  
 Martinetz, T. 645  
 Martinez, Dominique 3597  
 Martinez, G. 2203  
 Massa, P. 1854  
 Mashali, S. 856  
 Mashaly, H. 2545  
 Massengill, L. 1975  
 Mastriani, Ph.D., Mario 582  
 Maia, F. 2203  
 Matsuda, Satoshi 4563  
 Matsumura, Shigenori 2649  
 Matsuo, K. 1810  
 Matsuoka, K. 221  
 Matsuoka, Toshinobu 3154  
 Matsuyama, Y. 187, 4000  
 Mayol-Cuevas, W. 2112  
 Mayorga, M. 4078  
 Mazzanti, P. 3790  
 Mbamalu, G. 4730  
 McCann, P. 167  
 McCormack, Daniel 606  
 McCullough, C. 2350  
 McGonigal, M. 3495  
 McInerney, M. 641  
 McKenzie, P. 616  
 McLaughlin, R. 1654  
 McLaughlin, Robert 4028  
 McLaughlin, R. 4288  
 McMillin, B. 3828  
 McNeill, D. 1889, 2004  
 Meador, J. 1825  
 Means, R. 10  
 Medina, E. 483  
 Medsker, L. 1470, 1484  
 Meert, K. 3822  
 Mehrotra, K. 333  
 Mehrotra, K. 2191  
 Mei, R. 2530  
 Melax, Stan 3015  
 Mendez, J. 4583  
 Meng, M. 2743  
 Meng, Y. 4269  
 Menozzi, Albenco 44  
 Merat, F. 3024  
 Merchant, R. 3730  
 Merkl, D. 3905  
 Meyer-Base, A. 2436  
 Miftakhov, R.N. 2258  
 Migliore, M. 2264, 2272  
 Miikkulainen, R. 802  
 Milgram, M. 3190  
 Millar, D. 3326  
 Miller, B. 3024  
 Miller, G. 3461  
 Miller, W. 526  
 Miller, III, W.T. 2771  
 Millstrom, N. 3409  
 Minagawa, M. 3877  
 Ming, Y. 1542  
 Mingyu, F. 3601  
 Miramonti, J. 4006  
 Mitra, S. 1230  
 Mitsui, H. 3756  
 Mitsui, Hideo 1529  
 Miyazaki, Akihiro 2907, 3457  
 Mjolsness, E. 4601  
 Mjolsness, Eric 4629  
 Mogami, Yoshio 811  
 Mohammed, O. 3730  
 Mohan, C. 333, 2191  
 Mohandes, M. 555, 72  
 Mohiddin, S. 1600  
 Moll, M. 802  
 Monaco, Frank 2117  
 Montalvo, A. 1364  
 Moody, J.  
 Morasso, Pietro 653, 3127  
 Moreno, L. 4583  
 Morgan, N. 4462  
 Morgan, N. ???-0  
 Mori, T. 2819  
 Morita, M. 1032  
 Morter, M. 3232  
 Mouchot, M. 1772  
 Mouchot, M.C. 4044  
 Moya, M. 2979  
 Mrsic-Flogel, Janko 3196  
 Mueller, P. 111-1830, 1836  
 Mulawka, J. 840  
 Muller, Tibor 4145  
 Muller, U. I. 3961  
 Mulligan, Jr., J.H. 3806  
 Mundie, D. 1975  
 Murakami, K. 4619  
 Murata, N. 1159  
 Murgu, A. 2667  
 Murry, M. 4661, 4672  
 Muscato, G. ???-0  
 Musico, P. 3790  
 Myeong, H. 4559  
 Myler, H. 1121  
 Myllymaki, P. 1493  
 Nachtsheim, Philip 257  
 Nagashino, H. 2407  
 Naguib, R. 2122  
 Nakagawa, Masao 1062, 1080  
 Nakagawa, T. 4619  
 Nakai, Y. 2819  
 Nakanishi, S. 143  
 Nakano, R. 4687  
 Nakayama, H. 187  
 Nakayama, K. 149, 1163, 2997, 3909, 4237  
 Nam, K. 4220  
 Napolitano, M. 3796  
 Narayan, S. 50  
 Narendran, R. 3646  
 Natori, Naotake 2875  
 Nauck, Detlef 1638  
 Navarro, V. 3738  
 Naylor, D. 1969  
 Nazuno, J. 483  
 Neely, W. Shields 2022  
 Negatu, A. 1044  
 Neiss, E. 3056  
 Neittaanmaki, P. 2667  
 Nel, A. 2209  
 Nestor, D. 3693  
 Neti, Chalapathy 4425  
 Netto, M. 1000, 1691, 3750  
 Neumerkel, D. 3915  
 Ng, S. 892  
 Ngolediaze, J. 2122  
 Nguyen, Chung 3178  
 Nichani, Sanjay 4107  
 Nicodemus, S. 78  
 Nie, Junghong 3164  
 Niederjohn, R. 4483  
 Niemann, H. 4457  
 Nikiforuk, P. 1443  
 Nikolopoulos, C. 1818  
 Nilsson, K. 2938  
 Niranjana, M. 2034  
 Nishikawa, Y. 1319, 2254, 2813, 4169, 4390  
 Nishimura, K. 1163  
 Nishimura, Kazuo 2875  
 Nitta, Tooru 1-269, 934, 2895  
 Nix, D. 55  
 Noakes, P. 489  
 Nocera, P. 4421  
 Nogami, Takeki 3800  
 Noordewier, M. 3332  
 Norcio, A.F. 1169  
 Northmore, David 2028  
 Noth, E. 4457  
 Novato, S. 3900  
 Novelli, P. 3790  
 O'Brien, Frank 3178  
 O'Dowd, G. 3461  
 Oblow, E. 791  
 Obradovic, D. 686  
 Obradovic, Z. 204  
 Odonco, F. 3790  
 Oe, S. 2415  
 Ogawa, Hiromitsu 551  
 Ogunfunmi, T. 3559  
 Oh, H. 2070  
 Oh, S. 956, 986  
 Oh, Se-Young 2754  
 Ohkawa, Kazuya 2825  
 Ohm, T. 2500  
 Okabe, Y. 1556, 1783  
 Okuhara, K. 4119  
 Okuno, T. 1498  
 Olah, B. 61  
 Omar, S. 1654  
 Omar, Syed 4028  
 Omatsu, S. 2599  
 Omatu, S. 2367, 4243, 4390  
 Omatu, Sigeru 2649, 4154  
 Omlin, C. 1267, 1732  
 Omori, T. 2227  
 Onami, S. 4243  
 Onoda, T. 3766  
 Ortega, J. 2040  
 Osaki, S. 4119  
 Otawara, K. 3137  
 Owechko, Y. 4655  
 Ozawa, S. 1340  
 Ozdamar, O. 567  
 Ozguner, U. 2327  
 Ozurk, Y. 1103, 1130  
 Pados, D. 321  
 Page, E. 50  
 Palaniswami, M. 3592, 4033, 4159  
 Palmieri, F. 1258  
 Pandya, A. 2407, 4278, 4473  
 Pao, Y. 3697, 4718  
 Papaikononou, A. 872  
 Papantoni-Kazakos, P. 321  
 Pappu, S. 4601  
 Paradis, R. 2339  
 Park, C. 2411  
 Park, D. 1459, 3730  
 Park, Dong 1626, 3098, 4613  
 Park, G. 4718  
 Park, Hyoung 2754  
 Park, J. 1842, 4650, 4650  
 Park, S. 4755  
 Park, S. 3358  
 Park, Y. 1-94, 2568, 2928  
 Parkinson, W. ???-0  
 Parns, F. 1721  
 Parry, M. 4571  
 Parsini, T. 2383  
 Parthasarathy, G. 4101  
 Passero, E. 2901, 4232  
 Passaseo, M. 790  
 Pastavanu, O. 4766  
 Patel, D. 4265, 4316  
 Patel, R. 2859, 2859, 2956

# Authors Index

- Partichis, C.S. 3478  
 Pattison, T. 918  
 Paulos, J. 1364  
 Pearson, J.K. 1465  
 Pechanek, G. 1397, 4518, 4523  
 Pechanek, G.G. 1381  
 Pechanek, Ph.D., Gerald G. 2078  
 Pecharanin, N. 3756  
 Pecharanin, Narade 3067  
 Peiris, Vincent 2064  
 Pelillo, Marcello 1006  
 Pellenet, S. 1519  
 Pelzi, J. 3336  
 Peng, M. 4309  
 Perantonis, S. 285, 3866  
 Perez-Illarbe, M. 2643, 3226  
 Pemas, F. 4012  
 Perm Chen, Y. 187  
 Perov, Polievkt 4370  
 Peterson, Allen 28  
 Petridis, V. 872  
 Petrowski, A. 1981  
 Pfeiffermann, A. 407, 1589  
 Pfister, M. 2223  
 Pfurtscheller, G. 2890, 3448  
 Pham, C. 2093, 3559  
 Phuvan, S. 2394  
 Piazza, F. 309  
 Picart, D. 3348  
 Piche, Stephen 245  
 Piessens, L. 3693  
 Piguet, C. 2321  
 Pineiro, J. 4583  
 Pina, C. 4473  
 Piovoso, M. ???-0  
 Pipingas, A. 1749  
 Pirano, D. 4017  
 Pium, V. 4571  
 Platanios, K. 2344, 4710, 4736  
 Poechmueller, W. 407, 1589  
 Polhill, J. 2285  
 Pollack, J. 1375  
 Pong, T. 4343  
 Ponnambalam, S.G. 725  
 Poo, Gee-Swee 4396  
 Posthorff, C. 3420  
 Podapalli, H. 2703  
 Porter, I. 2948  
 Powers, Edward 3582  
 Prakasam, V. 3655  
 Pratt, L. 1-78, 3332  
 Pregonzer, M. 3448  
 Pregonzer, Martin 2890  
 Principe, J. 806, 2934, 3131, 3232, 4497  
 Principe, Jose C. 1793  
 Privitera, Claudio 3127  
 Prokhorov, D. 1028  
 Puechmorel, S. 395  
 Purushothaman, G. 1577  
 Puskorius, G. 2488  
 Qi-Ying, Xiao 2793  
 Qian, Gang 2089  
 Qian, W. 3437  
 Quelavoin, R. 4421  
 Quero, J. 2040  
 Raafat, H. 1301  
 Raetz, C. 3003  
 Rajpal, N. 3634  
 Ramamoorthy, P. 1421  
 Ramesh, N. 3061  
 Ranganath, H. 1285  
 Rangarajan, A. 4601  
 Rangarajan, Anand 4629  
 Ranka, S. 333, 2191  
 Rao, D. 175  
 Rao, D.H. 2518  
 Rao, N. 791  
 Rao, S. 3143  
 Raschhofer, R. 1804  
 Rauch, H. 1191  
 Raveendran, P. 4154  
 Ray, Sylvian R. 2315  
 Rayburn, D. 3530  
 Raza, H. 3363  
 Rea, H. 2797  
 Recht, M. 4017  
 Redmond, D. 3521  
 Reed, J. 3571  
 Regatten, M. 1691  
 Reguero, C.V. 3938  
 Reid, J. 2250  
 Reifman, Dr. Jaques 1449  
 Reinke, D. 4327  
 Reinschmidt, Kenneth 3834  
 Renders, J. 2476  
 Revell, N. 3856  
 Reyes, C. 4487  
 Reynolds, Albert 3289  
 Richmond, B. 4017  
 Rocha, A. 1691  
 Rodriguez-Vazquez, A. 1877, 3973  
 Rodriguez-Vazquez, A. 1993  
 Rogers, S. 2250  
 Rogers, Steven 305  
 Rojas, Raul 233  
 Romanuk, Steve G. 1331, 1710  
 Romem, Y. 3472  
 Romen, Y. 3540  
 Romsdahl, H. 1203  
 Romsdahl, Harlan 3894  
 Ronald, Edmund 531  
 Rosen, B. 4687  
 Rosen, D. 2213  
 Rosenberg, B. 3472  
 Rosenfeld, E. 2160  
 Rosenstiel, W. 1959  
 Roska, T. 1917  
 Ross, J.  
 Rossi, F. 546  
 Roy, C. 3409  
 Roy, S. 503  
 Roychowdhury, V. 4095  
 Rozgonyi, T. 4380  
 Rubin, M. 1613  
 Ruck, Dennis 305  
 Ryu, Y. 3431  
 Sabounin, Robert 4294  
 Sacha, J. 2185  
 Saerens, M. 2476  
 Saito, T. 1935  
 Saito, T. 992  
 Saitta, Lorenza 2952  
 Sako, H. 3071  
 Sakuma, M. 3207  
 Salam, F. 2070, 4746  
 Salome, T. 1307  
 Salu, Yehuda 4772  
 Samatsu, T. 1391  
 Sami, M. 4571  
 Sammut, K. 3840  
 Sanchez, E. 3938  
 Sanchez, J. 4583  
 Sano, H. 1537  
 Sanz, R. 2203  
 Sanz-Gonzalez, Jose 1799  
 Saratchandran, P. 3950  
 Sarkar, D. 131  
 Sarukkai, R. 4409  
 Sasai, T. 187  
 Sasaki, M. 3956  
 Sato, Atsushi 161  
 Sato, Y. 3122  
 Saryadas, A. 3641  
 Saunders, C. 1907  
 Sawai, H. 4253  
 Sbarbaro, D. 4567  
 Scaglione, L. 3415  
 Schaffner, M. 2842  
 Schaweiski, S. 3420  
 Schizas, C.N. 3478  
 Schlang, M. 467  
 Schlosser, M. 3420  
 Schmeisser, B. 1507  
 Schmitt, M.  
 Schneider, C. 1889  
 Schneider, R. 1889  
 Schnorrenberg, F. 3478  
 Schoenauer, Marc 531  
 Schultz, A. 3044  
 Schumacher, W. 3944  
 Schweikert, P. 407, 1589  
 Sciuto, D. 4571  
 Sebag, Martine 531  
 Seijas, Juan 1799  
 Sekine, O. 2254  
 Senda, Y. 992  
 Seo, J. 1427  
 Seres, I. 2282  
 Sergiou, A. 3478  
 Serrano, T. 1912  
 Sethi, I. 3061  
 Setono, R. 4761  
 Shadafan, R. 2034  
 Shadpey, F. 2956  
 Shaffer, Keith 2276  
 Shaham, Y. 3521  
 Shaheen, S. 856  
 Shahrzad, Hormoz 2333  
 Shams, S. 4655  
 Sharaf, A. 1760, 2550, 2916  
 Sharaf, A.M. 2545  
 Shawe-Taylor, J. 345  
 Sheedvash, S. 4321  
 Sheng, Chengke 1109  
 Sheu, B. 817, 1923, 2009, 2046, 3369  
 Shi, B.E. 1917  
 Shibata, K. 1556  
 Shibata, T. 1566  
 Shibata, Takanon 2825  
 Shigeta, Kazuo  
 Shimizu, Eiji  
 Shimizu, H. 771  
 Shimoji, S. 3088  
 Shin, Yoan 1433  
 Shinohara, Y. 2415  
 Shinozawa, K. 4210  
 Shirai, H. 4704  
 Shirazi, M. 1050  
 Shizawa, Masahiko 137  
 Shmurun, A. 1186  
 Shono, K. 2093  
 Si, J. 2400  
 Silberstein, R.B. 1749  
 Silva, F. 66  
 Silvestri, G. 3796  
 Sing, H. 3521  
 Sira-Ramirez, H. 2419  
 Sirisaengtaksin, O. 299  
 Site, J. 2419  
 Siy, P. 4693  
 Smid, J. 1346  
 Smith, S. 3780  
 So, Y. 681  
 Solaiman, B. 766, 1772, 3348, 3452, 4044  
 Soliman, H. 2550  
 Soliman, H.S. 4163  
 Somasundaram, M.V. 3646  
 Sone, M. 3756  
 Sone, Motoraka 1529, 3067  
 Sonenara, N. 4210  
 Song, I. 3431  
 Song, S.M. 1668  
 Soo, V. 2973  
 Specht, D. 1203  
 Speckmann, H. 1959  
 Spehl, J. 3336  
 Sperduti, A. 1143  
 Spracklen, C.T. 17  
 Spracklen, Tim 3888  
 Srivastava, A. 3786  
 Srivastava, V. 876  
 Stacey, D. 3342, 3525  
 Stachowitz, Rolf 3894  
 Stanta, A. 1143  
 Starr, F. 3056  
 Stauffer, A. 2321  
 Stevenson, M. 823  
 Steyaert, M. 1899, 1949  
 Stone, D. 2159  
 Stone, J. 84  
 Stonick, V. 453  
 Strauss, R. 3261  
 Strom, V. 4457  
 Su, Zhongren 2108  
 Sudhakar, R. 4278  
 Suh, S. VI-4650  
 Sultan, M. 1695  
 Sum, J. 1674  
 Sun, B. 459, 3211  
 Sun, Hong 1351, 3883  
 Sun, R. 1475, 1484  
 Sun, Yung-Nien 1092  
 Sundararajan, N. 3950  
 Sundareshan, M. 2616, 2684  
 Sundareshan, Malur 3932  
 Sung, A.H. 4163  
 Sungar, M. 3996  
 Swinarski, R. 3387  
 Syu, I. 3301  
 Syu, M. 3265  
 Szabo, Robert 3295  
 Szajner, J. 3750  
 Szepesvari, Cs. 61, 671, 1738, 1815, 2777  
 Taguchi, Akira 1529  
 Tai, Heng-Ming 3289  
 Takagi, T. 143  
 Takahashi, Hirokazu 3067  
 Takeda, F. 4243  
 Takefuji, Yoshiyasu 4667  
 Tam, S. 1186  
 Tamaki, U. 3216  
 Tan, M. 4000  
 Tan, S. 38  
 Tan, Shaohua 370, 3250  
 Tanahashi, N. 3484  
 Tanaka, Hideo 3457  
 Tanaka, M. 1929

# Authors Index

- Tanaka, M. 2093  
 Tanaka, T. 3770  
 Tanie, Kazuo 2825  
 Taniguchi, T. 4704  
 Tanprasert, T. 1513  
 Tao, T. 3926, 3967  
 Tascillo, A. 2460, 2803  
 Tavan, P. 698  
 Taylor, Ian 606  
 Taylor, J. 2239  
 Tazaki, E. 1743, 3534  
 Teeter, Jason 44, 600  
 Teng, C. 1295  
 Tenhagen, A. 1686  
 Tenono, Manoel F. 447, 736  
 Terada, K. 4243  
 Terman, D. 945  
 Terril, S. 3592  
 Tetko, Igor V. 376  
 Tezaur, R. 3816  
 Thakoor, A. 1907  
 Thole, P. 1959  
 Thoma, George R. 3009  
 Thomas, M. 3521  
 Thome, Antonio G. 447, 736  
 Thorne, D. 3521  
 Thornton, C. 633  
 Thrower, James P. 44  
 Tian, Q. 4384  
 Tianren, Yioa 1351  
 Tierney, J. 3856  
 Tirakis, A. 4055  
 Tirri, H. 1493  
 Tjoa, A. 3905  
 Tomabechi, H. 4437  
 Tong, C. 4607  
 Tong, CW 2143  
 Toomarian, N. 4592  
 Toris, D. 2737  
 Towsey, M. 567  
 Tracy, L. 3332  
 Tran, M. 1907  
 Tran, Tho Cong 2842  
 Trevino, E. 3367  
 Triantafyllou, George 2078  
 Tsai, C.T. 1092, 3104  
 Tsai, Chang-Rong 1074  
 Tsai, D. 3484  
 Tsai, Wu-Yuan 3289  
 Tsao, G. 3265  
 Tseng, L.Y. 578  
 Tseng, Y. 4066  
 Tsoi, A. 567  
 Tsoukalas, L. 3703  
 Tsukumo, Jun 161  
 Tsutsumi, K. 1340  
 Tufts, D. 708  
 Uchikawa, Y. 980, 980  
 Uchikawa, Y. 4333  
 Uchino, E. 1391  
 Ueno, F. 3956  
 Uhng, R. 3703  
 Uhng, Robert E. 3312, 3744  
 Ulug, M.E. 1662  
 Umeyama, S. 275  
 Uncini, A. 309  
 Uppuluri, V. 791  
 Upton, A.R.M. 572  
 Vaccari, D. 2217  
 Vakhutinsky, Andrew I. 4535  
 Valle, Montserrat 1525  
 Valli, G. 762  
 Van de Merckt, T. 263  
 van der Smagt, P. 2787  
 Van der Spiegel, J. 1830, 1836  
 van het Groenewoud, F. 2787  
 Van Hulle, Marc 3597  
 Van Hulle, Marc M. 4365  
 van Keulen, E. 1885  
 Van Keulen, E. 1955  
 Vanderbeek, R. 2131  
 Vandewalle, Joos 3250  
 Vanhala, J. 1149  
 Varoufakis, S. 285  
 Vassiliadis, S. 4518  
 Vassiliadis, S. 1381, 1397, 4523  
 Vassiliadis, Stamatis 2078  
 Vedantham, S. 4623  
 Vedula, S. 4746  
 Velasco, J. 2203  
 Veltri, R. 3461  
 Vemuri, V. 3571  
 Venkataraman, S. 2869  
 Venkas, Antanas 2938  
 Verma, B. 840  
 Verona, F. 3796  
 Villmann, T. 645  
 Vinz, B. 4337  
 Vipin, M. 876  
 Vishwakarma, Keshav P. 3674  
 Vitela, Javier 1449  
 Vittoz, E. 1883  
 Vladimir, P. 2611  
 Vogt, M. 3944  
 Voigt, H. 1355  
 von Rosenberg, M. 612  
 Vonder-Haar, T. 4327  
 Wah, B. 1295  
 Walczak, Steven 3680  
 Waldron, M. 951, 2885  
 Waldschmidt, K. 2052  
 Wallace, J.G. 1749  
 Wallinga, H. 1854  
 Walsh, N.E. 3507  
 Wan, K. 4384  
 Wang, C. 806  
 Wang, Chia-Jiu 1963, 3505  
 Wang, Chua-Chin 1074, 1137  
 Wang, D. 945, 3148  
 Wang, DeLiang 964  
 Wang, G. 4699  
 Wang, Gou-Jen 850  
 Wang, J. 2506, 2715, 2973  
 Wang, Jung-Hua 3201  
 Wang, K. 4452  
 Wang, M. 1012  
 Wang, Pei-Zhuang 38  
 Wang, S. 2973  
 Wang, Xin 494  
 Wang, Yeou-Fang 3806  
 Wang, Z. 832  
 Wantanapongse, P. 279  
 Washburne, Ted 3894  
 Watada, J. 1-155, 3686  
 Watanabe, E. 771  
 Watanabe, Sumio 777  
 Watanabe, T. 2720  
 Watta, P. 3761  
 Wawrzyniak, J.  
 Wechsler, H.  
 Wechsler, H. 4493  
 Wechsler, Harry 3009  
 Wee, B. 751  
 Weeks, A. 1121  
 Weerawarana, S. 2197  
 Weierich, P. 612  
 Weigl, K. 391  
 Weir, M. 2285  
 Wen, Rong-Chang 1943  
 Wendt, M. 2052  
 Weng, J. 4204  
 Weng, W. 1403  
 Wheeler, Kevin 3352  
 White, H. 2175  
 Whittington, G. 17  
 Wickersham, I. 862  
 Wiegand, A. 55  
 Wiegand, A. 3786  
 Wiegmann, W. 508  
 Wieske, Lothar 4049  
 Wilamowski, B. 1125  
 Wilcox, G. 22  
 Wildberger, A. 2373  
 Williams, L. 2131  
 Wilson, C.L. 3657  
 Wingate, D.L. 2258  
 Withagen, H. 1885, 1955, 2015, 2128  
 Wojciechowski, E. 2217  
 Wolf, D. 1355  
 Wolfe, W. 4571  
 Wollmer, P. 3504  
 Won Kim, T. 2781  
 Wong, W. 2454  
 Wong, W.S. 2153  
 Wong, Y. 4186  
 Wood, H.C. 2518  
 Wu, C.J. 1086  
 Wu, Chwan-Hwa 2022  
 Wu, F. 3318  
 Wu, G. 2506, 2715  
 Wu, I. 419  
 Wu, J. 649, 4169  
 Wu, T. 2046  
 Wu, X. 970, 1939  
 Wunsch, D. 2018  
 Wurst, K.H. 2720  
 Xia, S. 181  
 Xiao, R. 4084  
 Xiaomeng, Wan 1351  
 Xing, G. 1369, 3546, 4090  
 Xu, L. 1252  
 Xu, L. 315  
 Xu, Lei 1209  
 Xu, Q. 3828  
 Xu, W.L. 2720  
 Xu, Zong-Ben 1022  
 Xue, K. 4198  
 Xueqin, Z. 3403  
 Yabuta, T. 2628  
 Yacoub, Meziane 1503  
 Yadid-Pecht, O. 2991  
 Yagi, T. 4333  
 Yamada, T. 2628, 4687  
 Yamagishi, N. 2227  
 Yamakawa, T. 1391  
 Yamamoto, H. 2407  
 Yamasaki, Kazutaka 551  
 Yang, J. 2596, 3358  
 Yang, S.Q. 2720  
 Yang, Y. 4635  
 Yang, Z. 665  
 Yao, Tian-ren 3883  
 Yao, Y. 2743  
 Yeh, B. 3605  
 Yeh, Zong-Mu 2586  
 Yen, G. 2622  
 Yen, Gary 1038  
 Yesildirek, A. 2539  
 Yeung, D. 198, 4353  
 Yih, Y. 1507  
 Yip, Percy P.C. 4667  
 Yiwei, C. 521  
 Yokoi, H. 3877  
 Yokoi, K. 980  
 Yokoi, Yoshinori 3800  
 Yokoyama, Y. 3207  
 Yoon, B. 1766  
 Yoon, H.S. 3683  
 Yoon, T. 4220  
 Yorozawa, I.  
 Yoshida, K. 3534  
 Yoshuyuki, Usami 4529  
 You, S. 1325, 4149  
 Young, D. 1546, 3982  
 Young, F. 2058  
 Yousef, H. 3363  
 Yu, Vsevolod 376  
 Yu, X. 526  
 Yu, Xia-Hu 209  
 Yu, Yi 370  
 Yusuf, R. 2599  
 Yuwono, B. 3148  
 Zaghoul, M.E. 2276  
 Zaghwi, A. 464, 3271  
 Zak, S. 4547  
 Zalama, E. 2848  
 Zaman, R. 2018  
 Zaverucha, G. 3738  
 Zell, A. 719  
 Zeng, Shuang 1632  
 Zeng, Z. 193  
 Zhan, Jian 88, 1680  
 Zhang, Byoung-Tak 215  
 Zhang, C. 1012  
 Zhang, D. 517, 4479  
 Zhang, S. 4553  
 Zhang, Shuqun 2108  
 Zhang, W. 2361  
 Zhang, Xingnu 38  
 Zhang, Yitong  
 Zhang, Z. 459, 3211  
 Zhao, R. 4635  
 Zheng, B. 3437  
 Zheng-zhi, Wang 2793  
 Zhenjiang, M. 4133  
 Zhong, X. 2797  
 Zhongliang, J. 3403  
 Zhou, Hong 3505  
 Zhu, H. 3956  
 Zhu, X. 4553  
 Zhu, Y. 1459  
 Zickenheiner, S. 2052  
 Zoppoli, R. 2383  
 Zuben, F. 1000, 3750  
 Zuffa, M. 3790  
 Zuffa, Pedro 4113  
 Zurada, J. 11-1125, 2633  
 Zwahlen, Helmut 4226

# ICNN TABLE OF CONTENTS

## VOLUME I

### FAST LEARNING FOR NEURAL NETWORKS-INVITED SESSION

|                                                                                                           |    |
|-----------------------------------------------------------------------------------------------------------|----|
| A HIGH PERFORMANCE NEURAL NET SIMULATION ENVIRONMENT .....                                                | 1  |
| <i>U. Muller - Swiss Federal Institute of Technology, SWITZERLAND</i>                                     |    |
| A SUPERCOMPUTER FOR NEURAL COMPUTATION .....                                                              | 5  |
| <i>N. Morgan - International Computer Science</i>                                                         |    |
| HIGH SPEED PARALLEL HARDWARE PERFORMANCE ISSUES FOR NEURAL NETWORK APPLICATIONS.....                      | 10 |
| <i>R. Means - HNC, Inc., USA</i>                                                                          |    |
| EMULATION ON THE CNAPS MASSIVELY PARALLEL MICROPROCESSOR .....                                            |    |
| <i>not available at time of print</i>                                                                     |    |
| AN EFFICIENT MULTIPROCESSOR MAPPING ALGORITHM FOR THE KOHONEN FEATURE MAP AND ITS DERIVATIVE MODELS ..... | 17 |
| <i>G. Whittington, C.T. Spracklen - University of Aberdeen, UK</i>                                        |    |
| BENCHMARKING OF THE CM-5 AND THE CRAY MACHINES WITH A VERY LARGE BACKPROPAGATION NEURAL NETWORK .....     | 22 |
| <i>X. Liu, G. Wilcox - University of Minnesota, USA</i>                                                   |    |

### SUPERVISED LEARNING

|                                                                                                                                               |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----|
| REDUCING THE NUMBER OF MULTIPLIES IN BACKPROPAGATION .....                                                                                    | 28 |
| <i>Kan Boonyanit - LSI Logic Corporation, USA</i>                                                                                             |    |
| <i>Allen Peterson - STAR Lab, Department of Electrical Engineering, USA</i>                                                                   |    |
| ACCELERATING THE TRAINING OF FEED-FORWARD NEURAL NETWORKS USING GENERALIZED HEBBIAN RULES FOR INITIALIZING THE INTERNAL REPRESENTATIONS ..... | 32 |
| <i>Nicolaos Karayiannis - Department of Electrical Engineering, University of Houston, USA</i>                                                |    |
| THE DELTA RULE AND LEARNING FOR MIN-MAX NEURAL NETWORKS .....                                                                                 | 38 |
| <i>Xinghu Zhang, ChangChieh Hang, Pei-Zhuang Wang, S. Tan - National University of Singapore, SINGAPORE</i>                                   |    |
| BERNOULLI ERROR MEASURE APPROACH TO TRAIN FEEDFORWARD ARTIFICIAL NEURAL NETWORKS FOR CLASSIFICATION PROBLEMS .....                            | 44 |
| <i>Mo-yeun Chow, Paul Goode, Alberico Menozzi, Jason Teeter, James P. Thrower</i>                                                             |    |
| <i>North Carolina State University, USA</i>                                                                                                   |    |
| OPTIMIZING LOCALITY OF DATA REPRESENTATION IN MLP NETWORKS .....                                                                              | 50 |
| <i>S. Narayan, E. Page - Clemson University, USA</i>                                                                                          |    |
| ESTIMATING THE MEAN AND VARIANCE OF THE TARGET PROBABILITY DISTRIBUTION .....                                                                 | 55 |
| <i>D. Nix, A. Wiegand - University of Colorado at Boulder, USA</i>                                                                            |    |
| COMPLEXITY OF LEARNING: THE CASE OF EVERYDAY NEURAL NETWORKS .....                                                                            | 61 |
| <i>B. Olah, Cs. Szepesvari - Institute of Isotopes, HUNGARY</i>                                                                               |    |
| ON THE STABILITY OF SYMMETRIC ADAPTIVE DECORRELATION .....                                                                                    | 66 |
| <i>F. Silva, L. Almeida - INESC/IST, PORTUGAL</i>                                                                                             |    |
| PROJECTION-BASED METHODS FOR STEPSIZE ADAPTATION AND THEIR APPLICATION TO THE TRAINING OF FEEDFORWARD ARTIFICIAL NEURAL NETWORKS .....        | 72 |
| <i>C. Codrington, M. Mohandes - Purdue University, USA</i>                                                                                    |    |

|                                                                                                                                   |     |
|-----------------------------------------------------------------------------------------------------------------------------------|-----|
| CASE STUDIES IN THE USE OF A HYPERPLANE ANIMATOR FOR NEURAL NETWORK RESEARCH .....                                                | 78  |
| <i>L. Pratt, S. Nicodemus - Colorado School of Mines, USA</i>                                                                     |     |
| ON THE RELATIVE TIME COMPLEXITIES OF STANDARD AND CONJUGATE GRADIENT<br>BACK PROPAGATION .....                                    | 84  |
| <i>J. Stone, R. Lister - University of Sussex, ENGLAND</i>                                                                        |     |
| A NEW APPROACH IN MULTILAYER PERCEPTRON-FORWARD PROPAGATION (FP) .....                                                            | 88  |
| <i>Jian Zhan, Fu Li - Portland State University, USA</i>                                                                          |     |
| A MAPPING FROM LINEAR TREE CLASSIFIERS TO NEURAL NET CLASSIFIERS .....                                                            | 94  |
| <i>Y. Park - Kyung Hee University, KOREA</i>                                                                                      |     |
| ANTI-HEBBIAN RULE FOR FASTER BACKPROPAGATION LEARNING .....                                                                       | 101 |
| <i>Mohamed M. Bayoumi, Hazem M. Abbas -<br/>Department of Electrical Engineering, Queen's University at Kingston, CANADA</i>      |     |
| GMDP: A NOVEL UNIFIED NEURON MODEL FOR MULTILAYER FEEDFORWARD<br>NEURAL NETWORKS .....                                            | 107 |
| <i>S. Li, E. Leiss - University of Houston, USA<br/>Y. Chen - Western Atlas Software, USA</i>                                     |     |
| WEIGHT INITIALIZATION OF MLP CLASSIFIERS USING BOUNDARY-PRESERVING PATTERNS .....                                                 | 113 |
| <i>T. Kaylani, S. Dasgupta - Temple University, USA</i>                                                                           |     |
| A DIVIDE-AND-CONQUER METHODOLOGY FOR MODULAR SUPERVISED NEURAL<br>NETWORK DESIGN .....                                            | 119 |
| <i>H. Fu - National Chiao-Tung University, TAIWAN<br/>C. Chiang - Industrial Technology Research Institute, TAIWAN</i>            |     |
| THE SOLAR ALGORITHM .....                                                                                                         | 125 |
| <i>K. Demura, M. Kajiura, Y. Anzai - Keio University, JAPAN</i>                                                                   |     |
| RANDOMNESS IN GENERALIZATION ABILITY: A SOURCE TO IMPROVE IT? .....                                                               | 131 |
| <i>D. Sarkar - University of Miami, USA</i>                                                                                       |     |
| REGULARIZATION NETWORKS FOR APPROXIMATING MULTI-VALUED FUNCTIONS:<br>LEARNING AMBIGUOUS INPUT-OUTPUT MAPPINGS FROM EXAMPLES ..... | 137 |
| <i>Masahiko Shizawa - ATR Human Information Processing Research Laboratories,<br/>Advanced Telecommunications Research, JAPAN</i> |     |
| IMPROVING GENERALIZATION PERFORMANCE BY INFORMATION MINIMIZATION .....                                                            | 143 |
| <i>R. Kamimura, T. Takagi, S. Nakanishi - Tokai University, JAPAN</i>                                                             |     |
| OPTIMIZATION OF ACTIVATION FUNCTIONS IN MULTILAYER NEURAL NETWORK<br>APPLIED TO PATTERN CLASSIFICATION .....                      | 149 |
| <i>K. Nakayama, Y. Kimura - Kanazawa University, JAPAN</i>                                                                        |     |
| ENHANCED BACK-PROPAGATION LEARNING AND ITS APPLICATION TO BUSINESS<br>EVALUATION .....                                            | 155 |
| <i>J. Watanabe, M. Arisawa - Osaka Institute of Technology, JAPAN</i>                                                             |     |
| A CRITERION FOR TRAINING REFERENCE VECTORS AND IMPROVED VECTOR QUANTIZATION .....                                                 | 161 |
| <i>Atsushi Sato, Jun Tsukumo - Information Technology Research Laboratories, NEC Corporation, JAPAN</i>                           |     |
| PARALLEL TRAINING OF SIMPLE RECURRENT NEURAL NETWORKS .....                                                                       | 167 |
| <i>P. McCann, B. Kalman - Washington University, USA</i>                                                                          |     |

|                                                                                                                                  |                                |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| FEEDBACK-ERROR LEARNING SCHEME USING RECURRENT NEURAL NETWORKS FOR<br>NONLINEAR DYNAMIC SYSTEMS .....                            | 175                            |
| <i>D. Rao, D. Biner, M. Gupta - University of Saskatchewan, CANADA</i>                                                           |                                |
| METHOD OF DIGGING TUNNELS HORIZONTALLY INTO THE ERROR HYPERSURFACE<br>TO SPEED UP TRAINING AND TO ESCAPE FROM LOCAL MINIMA ..... | 181                            |
| <i>X. Liang - Peking University and Tsinghua University, P.R. CHINA</i>                                                          |                                |
| <i>S. Xia, J. Du - Tsinghua University, P.R. CHINA</i>                                                                           |                                |
| PENALIZED LEARNING AS MULTIPLE OBJECT OPTIMIZATION .....                                                                         | 187                            |
| <i>Y. Matsuyama - Ibaraki University, JAPAN</i>                                                                                  |                                |
| <i>H. Nakayama - Hitachi Ltd., JAPAN</i>                                                                                         |                                |
| <i>T. Sasai, Y. Perng Chen - Ibaraki University, JAPAN</i>                                                                       |                                |
| A LEARNING ALGORITHM FOR MULTI-LAYER PERCEPTRONS WITH HARD-LIMITING<br>THRESHOLD UNITS .....                                     | 193                            |
| <i>R. Goodman, Z. Zeng - California Institute of Technology USA</i>                                                              |                                |
| CONSTRUCTIVE NEURAL NETWORKS: SOME PRACTICAL CONSIDERATIONS .....                                                                | 198                            |
| <i>T. Kwok, D. Yeung - Hong Kong University of Science and Technology, HONG KONG</i>                                             |                                |
| CONSTRUCTIVELY LEARNING A NEAR-MINIMAL NEURAL NETWORK ARCHITECTURE .....                                                         | 204                            |
| <i>J. Fletcher, Z. Obradovic - Washington State University, USA</i>                                                              |                                |
| EXPLICIT SYNTHESIS OF MULTILAYER PERCEPTRONS USING WALSH EXPANSION .....                                                         | 209                            |
| <i>Xia-Hu Yu -</i>                                                                                                               |                                |
| <i>National Communications Research Laboratory, Department of Radio Engineering, P.R. CHINA</i>                                  |                                |
| AN INCREMENTAL LEARNING ALGORITHM THAT OPTIMIZES NETWORK SIZE AND<br>SAMPLE SIZE IN ONE TRIAL .....                              | 215                            |
| <i>Byoung-Tak Zhang -</i>                                                                                                        |                                |
| <i>German National Research Center for Computer Science (GMD), GERMANY</i>                                                       |                                |
| A NEURAL NET FOR BLIND SEPARATION OF NONSTATIONARY SIGNAL SOURCES .....                                                          | 221                            |
| <i>K. Matsuoka, M. Kawamoto - Kyusyu Institute of Technology</i>                                                                 |                                |
| IDENTIFICATION OF FLEXIBLE STRUCTURES WITH PIEZO-ELECTRIC SENSORS<br>AND ACTUATORS .....                                         | Not Available at time of Print |
| <i>P. Arena, L. Fortuna, S. Graziani, G. Muscato</i>                                                                             |                                |
| THE FRACTAL GEOMETRY OF BACKPROPAGATION .....                                                                                    | 233                            |
| <i>Rauli Rojas - Freie Universität Berlin, BERLIN</i>                                                                            |                                |
| STRUCTURE TRAINING OF NEURAL NETWORKS .....                                                                                      | 239                            |
| <i>A.K. Garga, N.K. Bose - The Pennsylvania State University, USA</i>                                                            |                                |
| THE SECOND DERIVATIVE OF A RECURRENT NETWORK .....                                                                               | 245                            |
| <i>Stephen Piche - Microelectronic and Computer Technology Corporation, USA</i>                                                  |                                |
| ANALYSIS OF INPUT VECTOR SPACE FOR SPEEDING UP LEARNING IN<br>FEEDFORWARD NEURAL NETWORKS .....                                  | 251                            |
| <i>Chidcharak Lursinsap - Center for Advanced Computer Studies, University of Southwestern Louisiana, USA</i>                    |                                |
| <i>Vasana Coowanitwong - Department of Mathematics, Chulalongkorn University, THAILAND</i>                                       |                                |
| A FIRST ORDER ADAPTIVE LEARNING RATE ALGORITHM FOR BACK PROPAGATION NETWORKS .....                                               | 257                            |
| <i>Philip Nachtsheim - Information Sciences Division (NASA ARC), USA</i>                                                         |                                |
| HOW TO "SECURE" THE DECISIONS OF A NN CLASSIFIER .....                                                                           | 263                            |
| <i>C. Decaestecker, T. Van de Merckt - Universite Libre de Bruxelles, BELGIUM</i>                                                |                                |

|                                                                                                                      |                 |
|----------------------------------------------------------------------------------------------------------------------|-----------------|
| STRUCTURE OF LEARNING IN THE COMPLEX NUMBERED BACK-PROPAGATION NETWORK .....                                         | 269             |
| <i>Tohru Nitta - Electrotechnical Laboratory, JAPAN</i>                                                              |                 |
| A STRUCTURAL LEARNING BY ADDING INDEPENDENT NOISES TO HIDDEN UNITS.....                                              | 275             |
| <i>T. Kurita, H. Asoh, S. Umeyama, S. Akaho, A. Hosomi - Electrotechnical Laboratory, JAPAN</i>                      |                 |
| STUDY ON EFFECT OF DETERMINISTIC LEARNING SEQUENCE .....                                                             | 279             |
| <i>C. Lursinap, P. Wantanapongse - Chulalongkorn University, THAILAND</i>                                            |                 |
| AN EFFICIENT CONSTRAINED LEARNING ALGORITHM FOR OPTIMAL LINEAR<br>SEPARABILITY OF THE INTERNAL REPRESENTATIONS ..... | 285             |
| <i>D. Karras, S. Perantonis, S. Varoufakis - Institute of Information and Telecommunications, GREECE</i>             |                 |
| TRANSFORMATION OF BACK-PROPAGATION NETWORKS IN MULTIREOLUTION LEARNING .....                                         | 290             |
| <i>W. Chan, L. Chan - Chinese University of Hong Kong, HONG KONG</i>                                                 |                 |
| DELTA TRAINING STRATEGIES .....                                                                                      | 295             |
| <i>I. Cloete, J. Ludik - University of Stellenbosch, SOUTH AFRICA</i>                                                |                 |
| WAVELET NEURAL NETWORKS ARE ASYMPTOTICALLY OPTIMAL APPROXIMATORS<br>FOR FUNCTIONS OF ONE VARIABLE .....              | 299             |
| <i>V. Kreinovich, O. Sirisaengtaksin, S. Cabrera - University of Texas at El Paso, USA</i>                           |                 |
| NEURAL NETWORK BAYES ERROR ESTIMATION .....                                                                          | 305             |
| <i>C. Martin, Steven Rogers, Dennis Ruck - Air Force Institute of Technology, USA</i>                                |                 |
| COMPARISON OF FOUR LEARNING ALGORITHMS FOR MULTILAYER PERCEPTRON<br>WITH FIR SYNAPSES .....                          | 309             |
| <i>N. Benvenuto - Universita di Padova, ITALY</i>                                                                    |                 |
| <i>F. Piazza, A. Uncini - Universita di Ancona, ITALY</i>                                                            |                 |
| MULTISETS MODELING LEARNING: AN UNIFIED THEORY FOR SUPERVISED AND<br>UNSUPERVISED LEARNING .....                     | 315             |
| <i>L. Xu - The Chinese University of Hong Kong and Peking University, HONG KONG</i>                                  |                 |
| A NOTE ON THE ESTIMATION OF THE GENERALIZATION ERROR AND THE<br>PREVENTION OF OVERFITTING .....                      | 321             |
| <i>D. Pados, P. Papantoni-Kazakos - University of Virginia, USA</i>                                                  |                 |
| HOW PRACTICAL ARE VC DIMENSION BOUNDS? .....                                                                         | 327             |
| <i>S. Holden - University of Cambridge, UNITED KINGDOM</i>                                                           |                 |
| MODIFYING TRAINING ALGORITHMS FOR IMPORVED FAULT TOLERANCE .....                                                     | 333             |
| <i>C. Chiu, K. Mehrota, C. Mohan, S. Ranka - Syracuse University, USA</i>                                            |                 |
| ADAPTIVE GAIN NETWORKS .....                                                                                         | 339             |
| <i>C. Codrington - Purdue University, USA</i>                                                                        |                 |
| INTRODUCING INVARIANCE: A PRINCIPLES APPROACH TO WEIGHT SHARING .....                                                | 345             |
| <i>J. Shawe-Taylor - University of London, UK</i>                                                                    |                 |
| A LARGE SCALE NEURAL NETWORK WITH NONLINEAR SYNAPSES.....                                                            | 350             |
| <i>J. Lont - Swiss Federal Institute of Technology, SWITZERLAND</i>                                                  |                 |
| STRUCTURAL LEARNING AND ITS APPLICATIONS TO RULE EXTRACTION .....                                                    | 354             |
| <i>M. Ishikawa - Kyushu Institute of Technology, JAPAN</i>                                                           |                 |
| THE DEPENDENCE IDENTIFICATION NEURAL NETWORK CONSTRUCTION ALGORITHM .....                                            | End of Vol. VII |
| <i>J. Moody, P. Antsaklis - University of Notre Dame, USA</i>                                                        |                 |

|                                                                                                                                |     |
|--------------------------------------------------------------------------------------------------------------------------------|-----|
| A STUDY ON THE PARTITIONING CAPABILITIES OF TWO-LAYER NEURAL NETWORKS .....                                                    | 360 |
| <i>C. Lin, A. El-Jaroudi - University of Pittsburgh, USA</i>                                                                   |     |
| NETWORK COMPLEXITY AND LEARNING EFFICIENCY OF CONSTRUCTIVE LEARNING ALGORITHMS .....                                           | 366 |
| <i>W. Fang, R. Lacher - Florida State University, USA</i>                                                                      |     |
| ON-LINE STABLE NONLINEAR MODELLING BY STRUCTURALLY ADAPTIVE NEURAL NETS .....                                                  | 370 |
| <i>Shaohua Tan, Yi Yu - Department of Electrical Engineering, National University of Singapore, SINGAPORE</i>                  |     |
| SIMPLE HEURISTIC METHODS FOR INPUT PARAMETERS' ESTIMATION IN NEURAL NETWORKS .....                                             | 376 |
| <i>Igor V. Tetko, Vsevolod Yu, Alexander Luik - Institute of Bioorganic &amp; Petroleum Chemistry, UKRAINE</i>                 |     |
| A NOTE ON BACKPROPAGATION, PROJECTION LEARNING, AND FEEDBACK IN NEURAL SYSTEMS .....                                           | 391 |
| <i>K. Weigl - INRIA, FRANCE</i>                                                                                                |     |
| THE MANIFOLD BACK PROPAGATION ALGORITHM .....                                                                                  | 395 |
| <i>S. Puechmorel, M. Kahla, F. Castanie - ENSEEIHT-GAPSE, FRANCE</i>                                                           |     |
| MMI TRAINING OF MINIMUM COMPLEXITY ADAPTIVE NEAREST NEIGHBOR CLASSIFIERS .....                                                 | 401 |
| <i>W. Fakhri, M. Kamel, M.I. Elmastry - University of Waterloo, CANADA</i>                                                     |     |
| RBF AND CBF NEURAL NETWORK LEARNING PROCEDURES .....                                                                           | 407 |
| <i>W. Poehnmueiller, S. Halgamuge, M. Glesner, P. Schweikert, A. Pfeffermann - Darmstadt University of Technology, GERMANY</i> |     |
| APPLICATION OF PRONY SIGNAL ANALYSIS TO RECURRENT NEURAL NETWORKS.....                                                         | 413 |
| <i>C. Isik, M. Farrokhi - Syracuse University, USA</i>                                                                         |     |
| MAXIMIZING FAULT TOLERANCE IN MULTILAYER NEURAL NETWORKS .....                                                                 | 419 |
| <i>C. Lin, I. Wu - University of Missouri at Columbia, USA</i>                                                                 |     |
| PREPROCESSING OF TRAINING FOR BACK PROPAGATION ALGORITHM: HISTOGRAM EQUALIZATION .....                                         | 425 |
| <i>Taek Kwon, Ehsan Feroz, Hui Cheng - University of Minnesota, Duluth, USA</i>                                                |     |
| FAULT-TOLERANCE INCLUSION IN NEURAL NETWORKS BY A CONCURRENT TRAINING ALGORITHM .....                                          | 431 |
| <i>C. Chu, C. Chow - University of Southwestern Louisiana, USA</i>                                                             |     |
| REINFORCEMENT LEARNING USING A RECURRENT NEURAL NETWORK .....                                                                  | 437 |
| <i>F. Ho, M. Kamel - University of Waterloo, CANADA</i>                                                                        |     |
| A MULTI TEMPORAL TRAINABLE DELAY NEURAL NETWORK .....                                                                          | 441 |
| <i>E. Jumper - Griffis AFB, USA</i>                                                                                            |     |
| DYNAMIC ADAPTION OF THE ERROR SURFACE FOR THE ACCELERATION OF THE TRAINING OF NEURAL NETWORKS .....                            | 447 |
| <i>Antonio G. Thome, Manoel F. Tenorio - Purdue University, USA</i>                                                            |     |
| BIFURCATIONS IN NONLINEAR NETWORKS INITIALIZED WITH LINEAR NETWORK WEIGHT SOLUTIONS .....                                      | 453 |
| <i>V. Stonick, F. Coetzee - Carnegie Mellon University, USA</i>                                                                |     |
| A NEURAL NETWORK MODEL WITH COMPENSATING INPUTS .....                                                                          | 459 |
| <i>B. Sun, Z. Zhang - China Academy of Electronics and Information Technology, CHINA</i>                                       |     |
| AN AUTOMATED APPROACH FOR SELECTING THE LEARNING RATE AND MOMENTUM IN BACK-PROPAGATION NETWORKS .....                          | 464 |
| <i>A. Zaghw, W. Dong - Cairo University, EGYPT</i>                                                                             |     |
| NN-LEARNING WITH BACKPROPAGATION AND ADAPTIVE FILTER TECHNIQUES .....                                                          | 470 |
| <i>B. Humpert - University of Houston, USA</i>                                                                                 |     |

|                                                                                                                                           |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----|
| AN UPDATE FUNCTION THAT SPEEDS UP BACKPROPAGATION LEARNING .....                                                                          | 477 |
| <i>W. El Deredy, N.M. Branstor - Institute of Neurology, Queen Square, UK</i>                                                             |     |
| EXPERIMENTAL ANALYSIS OF THE RANDOM MEMORY SPACE .....                                                                                    | 483 |
| <i>J. Nazuno, W. Cuevas, R. Guzman, E. Medina - Universidad del Valle De Mexico, MEXICO</i>                                               |     |
| DIRECTED PRODUCT TERM SELECTION IN SIGMA-PI NETWORKS.....                                                                                 | 489 |
| <i>P. Noakes, M. Heywood - University of Essex, U.K.</i>                                                                                  |     |
| AN EFFICIENT TRAINING ALGORITHM FOR MULTILAYER NEURAL NETWORKS BY HOMOTOPY<br>CONTINUATION METHOD .....                                   | 494 |
| <i>Xin Wang - Harbin Institute of Technology, P.R. CHINA</i>                                                                              |     |
| AN IMPLEMENTATION AND EVALUATION OF THE ART1 NEURAL NETWORK FOR PATTERN RECOGNITION .....                                                 | 498 |
| <i>J. Albright - Southern College of Technology, USA</i>                                                                                  |     |
| FACTORS INFLUENCING THE CHOICE OF A LEARNING RATE FOR A BACK-PROPAGATION<br>NEURAL NETWORK .....                                          | 503 |
| <i>S. Roy - Defense Research Establishment Valcartier, CANADA</i>                                                                         |     |
| SCALING PROPERTIES OF ON-LINE LEARNING WITH MOMENTUM .....                                                                                | 508 |
| <i>T. Heskes - University of Illinois, USA</i>                                                                                            |     |
| <i>W. Wiegierinck, A. Komoda - University of Nijmegen, THE NETHERLANDS</i>                                                                |     |
| A ROBUST APPROACH TO SUPERVISED LEARNING IN NEURAL NETWORK.....                                                                           | 513 |
| <i>K. Liano - Pavilion Technologies, USA</i>                                                                                              |     |
| A TRAINING APPROACH BASED ON LINEAR SEPARABILITY ANALYSIS FOR LAYERED PERCEPTRONS .....                                                   | 517 |
| <i>D. Zhang, M. Kamel, M.I. Elmasry - University of Waterloo Ontario, CANADA</i>                                                          |     |
| FEEDFORWARD NEURAL NETWORKS TO LEARN DRAWING LINES .....                                                                                  | 521 |
| <i>C. Yiwei - Western Atlas Software Houston, USA</i>                                                                                     |     |
| <i>F. Bastani - University of Houston, USA</i>                                                                                            |     |
| TRAINING HARD-LIMITING NEURONS USING BACK-PROPAGATION ALGORITHM BY UPDATING<br>STEEPNESS FACTORS .....                                    | 526 |
| <i>X. Yu, W. Miller - University of Windsor, CANADA</i>                                                                                   |     |
| <i>N. loh - Oakland University, USA</i>                                                                                                   |     |
| FEATURE INDUCTION BY BACKPROPAGATION .....                                                                                                | 531 |
| <i>Edmund Ronald, Marc Schoenauer, Martine Sebag - CMAP, Ecole Polytechnique, FRANCE</i>                                                  |     |
| ON MODIFYING THE WEIGHTS IN A MODULAR RECURRENT CONNECTIONIST SYSTEM .....                                                                | 535 |
| <i>H. Elsherif, M. Hambaba - Stevens Institute of Technology, USA</i>                                                                     |     |
| AN EFFICIENT ALGORITHM FOR CLUSTERING DATA AND BEST MODEL SELECTION USING AIC .....                                                       | 540 |
| <i>Shizuo Asogawa, Norio Akamatsu -</i>                                                                                                   |     |
| <i>Intelligence Information Engineering Department, Tokushima University, JAPAN</i>                                                       |     |
| GEOMETRICAL INITIALIZATION, PARAMETRIZATION AND CONTROL OF MULTILAYER<br>PERCEPTRONS: APPLICATION TO FUNCTION APPROXIMATION .....         | 546 |
| <i>F. Rossi, C. Gegout - Ecole Normale Supérieure de Paris, FRANCE</i>                                                                    |     |
| A CHOOSING METHOD OF TRAINING SETS WHICH PREVENT OVER-LEARNING .....                                                                      | 551 |
| <i>Kazutaka Yamasaki, Hidemitsu Ogawa - Tokyo Institute of Technology, JAPAN</i>                                                          |     |
| TWO ADAPTIVE STEPSIZE RULES FOR GRADIENT DESCENT AND THEIR APPLICATION TO THE<br>TRAINING OF FEEDFORWARD ARTIFICIAL NEURAL NETWORKS ..... | 555 |
| <i>S. Gelfand, M. Monandes, C. Codrington - Purdue University, USA</i>                                                                    |     |

|                                                                                                                                                  |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| SEQUENTIAL CLASSIFICATION BY PERCEPTRONS AND APPLICATION TO NET PRUNIGN OF<br>MULTILAYER PERCEPTRON .....                                        | 561 |
| <i>Kou-Yuan Huang - National Chiao Tung University, R.O.C.</i>                                                                                   |     |
| ARE MODIFIED BACK-PROPAGATION ALGORITHMS WORTH THE EFFORT? .....                                                                                 | 567 |
| <i>Dr. Doghan Alpsan - U A E University, Department of Medical Physics and Engineering, UNITED ARAB EMIRATES</i>                                 |     |
| <i>M. Towsey - United Arab Emirates University, Department of Medical Physics and Engineering, UNITED ARAB EMIRATES</i>                          |     |
| <i>O. Ozdamar - Department of Biomedical Engineering, University of Miami, USA</i>                                                               |     |
| <i>A. Tsoi - University of Queensland, Queensland, AUSTRALIA</i>                                                                                 |     |
| <i>D.N. Ghista - U A E University, Department of Medical Physics and Engineering, UNITED ARAB EMIRATES</i>                                       |     |
| A NOVEL APPROACH TO FAST LEARNING : SMART NEURAL NETS .....                                                                                      | 572 |
| <i>B.W. Dahanayake, A.R.M. Upton - Division of Neurology, McMaster University, CANADA</i>                                                        |     |
| SPEED UN THE LEARNING PROCESS OF FEEDFORWARD NEURAL NETWORKS .....                                                                               | 578 |
| <i>L.Y. Tseng, T.H. Huang - National Chung Hsing University, R.O.C.</i>                                                                          |     |
| A FAST AND ROBUST PATTERN RECOGNITION USING A NEW ALGORITHM FOR TRAINING<br>FEED-FORWARD NEURAL NETWORKS .....                                   | 582 |
| <i>Mario Mastriani, Ph.D. - Universidad de Buenos Aires, ARGENTINA</i>                                                                           |     |
| GENERALIZATION AND C-INFORMATION .....                                                                                                           | 588 |
| <i>Ryotaro Kamimura - Information Science Laboratory, Tokai University, JAPAN</i>                                                                |     |
| IMPROVING GENERALIZATION PERFORMANCE BY CONTROLLING ALPHA-INFORMATION .....                                                                      | 594 |
| <i>Ryotaro Kamimura - Information Science Laboratory, Department of Electrical Engineering, Tokai University, JAPAN</i>                          |     |
| AN ANALYSIS OF WEIGHT DECAY AS A METHODOLOGY OF REDUCING THREE-LAYER<br>FEEDFORWARD ARTIFICIAL NEURAL NETWORKS FOR CLASSIFICATION PROBLEMS ..... | 600 |
| <i>Mo-yuen Chow, Jason Teeter - Department of Electrical and Computer Engineering,<br/>North Carolina State University, USA</i>                  |     |

# VOLUME II

## UNSUPERVISED LEARNING

|                                                                                                                            |     |
|----------------------------------------------------------------------------------------------------------------------------|-----|
| S__ART: A MODIFIED ART 2-A ALGORITHM WITH RAPID INTERMEDIATE LEARNING CAPABILITIES .....                                   | 606 |
| <i>Ian Taylor, Mike Greenhough - Department of Physics &amp; Astronomy, UK</i>                                             |     |
| <i>Daniel McCormack - Department of Computing Mathematics, University of Wales, College of Cardiff, UK</i>                 |     |
| THE USE OF FORMAL MEASURES FOR THE TRAINING OF HIERARCHICAL KOHONEN MAPS .....                                             | 612 |
| <i>P. Weierich, M. von Rosenberg - Bavarian Research Ctr. for Knowledge-Based Systems, GERMANY</i>                         |     |
| UNSUPERVISED LEARNING: THE DOG RABBIT STRATEGY .....                                                                       | 616 |
| <i>M. Alder, P. McKenzie - University of Western Australia, AUSTRALIA</i>                                                  |     |
| STOCHASTICALLY COMPETITIVE LEARNING ALGORITHM FOR VECTOR QUANTIZER DESIGN .....                                            | 622 |
| <i>Hao Bi, Guangguo Bi, Yimin Mao - Department of Radio Engineering, Southeast University, CHINA</i>                       |     |
| DYNAMIC HIERARCHICAL SELF-ORGANIZING NEURAL NETWORKS .....                                                                 | 627 |
| <i>W. Lin, H. Hung - Northwestern University, USA</i>                                                                      |     |
| UNSUPERVISED LEARNING WITH THE SOFT-MEANS ALGORITHM .....                                                                  | 633 |
| <i>C. Thornton - University of Sussex, BRIGHTON</i>                                                                        |     |
| NONLINEAR DATA COMPRESSION AND REPRESENTATION BY COMBINING SELF-ORGANIZING<br>MAP AND SUBSPACE RULE .....                  | 637 |
| <i>J. Joutsensalo - Helsinki University of Technology, FINLAND</i>                                                         |     |
| TRAINING THE SELF-ORGANIZING FEATURE MAP USING HYBRIDS OF GENETIC AND<br>KOHONEN METHODS .....                             | 641 |
| <i>M. McInerney - Rose-Hulman Institute, USA</i>                                                                           |     |
| <i>A. Dhawan - University of Cincinnati, USA</i>                                                                           |     |
| A NEW QUANTITATIVE MEASURE OF TOPOLOGY PRESERVATION IN KOHONEN'S FEATURE MAPS .....                                        | 645 |
| <i>T. Villmann, R. Der - University Leipzig, GERMANY</i>                                                                   |     |
| <i>T. Martinetz - Siemens AG, GERMANY</i>                                                                                  |     |
| MANAGING THE NOISY GLAUCOMATOUS TEST DATA BY SELF ORGANISING MAPS .....                                                    | 649 |
| <i>X. Liu, G. Cheng, J. Wu - Birkbeck College, U.K.</i>                                                                    |     |
| THE "CAPTURE EFFECT": A NEW SELF-ORGANIZING NETWORK FOR "ADAPTIVE RESOLUTION"<br>CLUSTERING IN CHANGING ENVIRONMENTS ..... | 653 |
| <i>Federico Firenze, Pietro Morasso - University of Genova, ITALY</i>                                                      |     |
| A MEASURE OF DISORDER FOR THE SELF-ORGANIZING MAP .....                                                                    | 659 |
| <i>Ari Hamalainen - Rolf Nevanlinna Institute, FINLAND</i>                                                                 |     |
| AN UNSUPERVISED NEURAL NETWORK APPROACH FOR MACHINE-PART CELL DESIGN .....                                                 | 665 |
| <i>B. Malakooti, Z. Yang - Case Western Reserve University, USA</i>                                                        |     |
| SELF-ORGANIZED LEARNING OF 3 DIMENSIONS .....                                                                              | 671 |
| <i>Cs. Szepešvari, A. Lorincz - Institute of Isotopes, HUNGARY</i>                                                         |     |
| AN UNSUPERVISED NEURAL NETWORK WITH A MEMORY REPLACEMENT EFFECT .....                                                      | 675 |
| <i>C. Lee, C. Chung - Hong Kong Polytechnic, HONG KONG</i>                                                                 |     |
| TOPOLOGICAL PRESERVING NETWORK BY THE EXISTENCE OF LATERAL FEEDBACK .....                                                  | 681 |
| <i>Y. So - The Chinese University of Hong Kong, HONG KONG</i>                                                              |     |
| <i>K. Chan - The University of Hong Kong, HONG KONG</i>                                                                    |     |
| LINEAR FEATURE EXTRACTION IN NETWORKS WITH LATERAL CONNECTIONS .....                                                       | 686 |
| <i>D. Obradovic, G. Deco - Siemens AG, Corporate Research and Development, GERMANY</i>                                     |     |