Statement of Qualifications

Bert de Vries

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Contents

Objective

It is my objective to expand my career as a leader, driver and investigator of commercially important problems in medical engineering research, in particular when the issues relate to difficult data processing problems. My assets include a strong and active record both as a research driver/leader and as a principal investigator, in addition to a broad international experience both in industry and academia (last 25 years: 14 years in USA, 11 years in Europe). I'm interested in industrial as well as academic opportunities. Example compatible function titles include VP or Director of Research, Principal Scientist and Professor.

Background

Research

My professional research interests and expertise mainly concern (digital) signal processing (DSP), machine learning and applications to medical (device) engineering problems. I have been working in these fields since my own Ph.D.-research (1991, University of Florida), which concerned design and useful applications of neurally-inspired signal processing structures. Over the years I have learned that complex systems design starts with first building the simplest but still functional realization

of a solution, followed by iterative improvement based on end user feedback. This idea extends to my philosophy on engineering research: bring in the end user as soon as possible.

Consider Figure 1 to illustrate my recent research work. A DSP algorithm transforms a raw input for presentation to an end user. In my current occupation, the DSP algorithm is a Hearing Aid (HA) processor and the end user a HA patient. As it is unknown which algorithm is optimal for the patient, we equip the DSP algorithm with adjustable parameters. Commercial HA algorithms contain about 140 of such tuning parameters (most of them under the hood). If we assume 5 potentially interesting values for each parameter (e.g., very low, low, medium, large and very large), then the total number of parameter settings equals 5^{140}, which is far more than the number of electrons in the universe (about 5^{115}). Hence, the problem of finding the best HA algorithm for a patient is much like searching for a needle in a haystack.We cannot ask the patient to tune the DSP parameters himself, because the search space is too large and the preferred settings may change over time as the patient moves from his home into his car and later to an office environment. We can however ask the patient to provide the simplest form of preference feedback: just tab the HA (or shake his head, say a code word, etc.) if he's not happy with his HA processor. I created an interactive machine learning approach that learns the correct settings for the HA processor, straight from simple end user feedback and without loss of information. In principle, this approach extends to other applications areas such as customer personalization of TV monitors or tuning of medical image processing algorithms to maximize discovery of potentially malignant calcifications by a medical specialist. In general, signal processing and machine learning form complementary fields for the design of medical information processing systems with the end user in the loop.

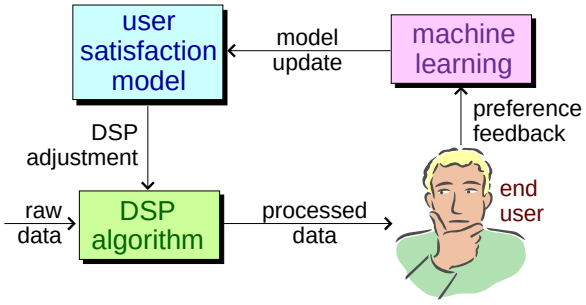

Figure 1: Interactive machine learning for DSP personalization.

At GN ReSound, I am a **Principal Scientist**. My DSP algorithms are integrated in many commercially available hearing aids, both for the Beltone and ReSound brand names. I am also affiliated as a **Research Fellow** with the Signal Processing Systems group (`w3.ele.tue.nl/en/sps`) at the Technical University Eindhoven (TU/e), where I teach a graduate class on adaptive information processing and supervise graduate students. Before ReSound, I was employed as a research scientist at Sarnoff Corporation (`www.sarnoff.com`) in Princeton, NJ, where I contributed to research projects over a wide range of signal and image processing topics such as word spotting, financial market prediction and breast cancer detection from mammograms.

(grant) writing

As an research engineer, I design systems to solve problems. While a university researcher might justifiably attack problems that are 'just' scientifically interesting, as an industrial researcher I seek to solve problems that are both interesting as well as commercially important. Throughout my research career, I've had a keen interest in linking scientific research to the real (commercial) world through writing of fund acquisition proposals (about 4 major successes), patents (about 13) and scientific publications (about 60). For example, through my affiliation with the TU/e, I wrote, together with Profs. Tom Heskes (RU Nijmegen) and Wouter Dreschler (VU Amsterdam), a research

grant proposal (entitled: *Personalization of Hearing Aids through Bayesian Preference Elicitation*), which in 2006 was awarded a 650 K€ research grant by STW (Dutch government foundation for scientific research). At Sarnoff Corporation, I successfully acquired a 600K USD contract from an industrial client to develop speech processing algorithms for mobile telephones.

Management

Over my career, I've managed research teams in both project and line managerial roles. At ReSound, next to my role as a principal scientist, I am currently **head of the DSP Research group**, which encompasses about 10 researchers. Over the past 6 years, I've also served as ReSound's external research manager, which involves initiation, coordination and (budget) management of research projects that are executed in collaboration with top universities. Before ReSound, at Philips Hearing Systems (1999-2000), I lead the algorithm R&D group in developing DSP algorithms for the next generation of commercial hearing aids. Moreover, as an adjunct faculty member at the TU/e, I supervise graduate students and their research projects.

In general, my style of managing a high-quality engineering research group rests on three principles: (1) as a research leader, I strive to set and maintain a spot on the horizon for each project. Rather than working on a general area, I think that engineers are motivated by a challenge. Small successes are celebrated to keep the morale high. (2) Build a working system early, and iterate based on end user feedback. If the latter is not possible, still spend ample resources on testing to drive the direction of the project. (3) Finally, lead by example, since researchers are inspired by peers, not by managers. As a leader of a research group, I seek to set the example by partaking in the effort and filling holes where necessary. I've found that a sustained focus on these three principles improve the performance of both academic as well as industrial research projects.

Teaching

Since 2004 I teach a core graduate-level class on adaptive information processing in the electrical engineering department at the Technical University Eindhoven (`http://www.sps.ele.tue.nl/members/b.vries/teaching/5mb20/index.html`). I have also organized several in-house courses at ReSound. I enjoy teaching and find it one of the more rewarding tasks that I work on. My teaching style derives from the philosophy that in order to really understand a concept, one must recreate it. In other words, learning involves creative activity from the student. If the opportunity arises, I am prepared to develop courses in medical engineering, signal processing and machine learning at all academic levels.

Curriculum Vitae

Principal Interests

Signal processing, medical engineering, machine learning, statistics, research management, technical writing; applications to medical devices, clinical trial design/analysis, hearing rehabilitation, multimedia processing, digital communications and neural engineering.

Academic Background

12/91, Ph.D. Electrical Engineering, University of Florida Gainesville, FL

Ph.D. research in signal processing under direction of Professor Jose C. Principe. Dissertation title: *Temporal processing with neural networks—the development of the gamma model.*

12/86, M.E. Electrical Engineering, Technical University Eindhoven Eindhoven, the Netherlands

Focus areas: medical (thesis: intelligent alarms during anaesthesia) and digital communications engineering.

Employment History

'99-pres., Head DSP Research and Principal Scientist, GN ReSound (Philips Hearing Technologies until 2001) Eindhoven, the Netherlands

Head DSP Research ('08-pres.): Responsible for the corporate research track, including the roadmap, budget and management of ReSound's DSP research activities.

Principal Scientist ('99-pres.): Research on signal processing technology for the next generation of digital hearing aids. Work with management on the definition and implementation of key technology roadmaps. Leader hearing aids DSP algorithm team (Philips). Tasks included all aspects of team/project management (team of about 10 engineers), and principal investigator for low power DSP hardware/software co-design (developed novel low power DSP for noise reduction, feedback suppression and filterbank technology).

Manager External Research ('01-'08): responsible for initiating and managing key studies at academic institutions and contract research organizations, including establishing appropriate legal/contractual agreements, drafting and reviewing protocols, visiting sites to monitor studies when needed.

'04-pres., Research Fellow, Technical University Eindhoven, Signal Processing Systems Group Eindhoven, the Netherlands

1 day/week appointment; supervise graduate students, research and proposal writing; teach graduate class on Adaptive Information Processing.

'93-'99, Member Technical Staff, Sarnoff Corporation Princeton, NJ

Research in advanced signal processing algorithms, initiating new technical and commercial thrusts, technical proposal writing and project management.

Principal accomplishments: Leader signal processing research team. Initiated and developed speech research program at Sarnoff. Principal investigator of funded projects on keyword spotting, hearing aids signal processing, speech enhancement and noise-robust speech recognition (co-PI). Initiated and developed signal processing in financial markets program at Sarnoff. Member medical image processing research team. Funded projects included blind signal processing for

breast mammography and perceptually optimized image coding. Developed and patented various signal processing methods with applications in speech and signal detection. Invited researcher at government sponsored special study group on robust speech recognition. Professional involvement included IEEE technical committee membership, conference session chair, conference publicity chair and peer manuscript reviewing.

'92-'93, Postdoctoral Fellow, David Sarnoff Research Center

Princeton, NJ

Developed neural network based speech recognition method (50% error reduction relative to competing methods).

'87-'91, Research/Teaching Assistant, University of Florida

Gainesville, FL

Taught and assisted in graduate classes in digital signal processing, control theory and computer architecture. Developed and patented gamma neural network for Ph.D. research. My work grew to become a focus area for several reputed researchers in neural network based speech recognition and other applications.

Special Achievements

Awards

- Return-on-Performance Award, for technical work on Speech Enhancement technology, Sarnoff Corporation, 1998
- Achievement Award, for "Leadership and technical contributions in the area of adaptive speech enhancement", Sarnoff Corporation, 1997
- David Sarnoff Event Focus Award for "Winning Sarnoff's First Commercial Contract for Speech Processing", David Sarnoff Research Center, 1996.
- Presidential Recognition Award, University of Florida, 1988.
- δ-Butterweck Award (awards top GPA), Technical University Eindhoven, 1984.

Invited Lectures (selection)

- Delft Univ. of Technology, ("Machine Learning for Hearing Aids Technology"), Delft March 2012
- International Forum for Hearing Instrument Developers, ("Bayesian Machine Learning for Hearing Aid Design, Fitting and Personalization"), Oldenburg (Germany), June 2011
- University of Florida, ("Machine Learning Trends in the Hearing Aids Industry"), Gainesville, FL, April 2010
- SIKS Research School, ("Gaussian mixture models and the EM Algorithm"), Vught, Dec 2008
- GN Nordic Audiology College, ("Learning technology in hearing aids"), Oslo, Norway, Sep 29, 2006

- University of Nijmegen, ("Machine learning for hearing aids"), Nijmegen, Netherlands, June 2004
- University of Florida, ("DSP for modern industrial hearing aids"), Gainesville, FL, January 2004
- International Forum for Hearing Aid Developers ("Warped-frequency filterbanks"), Oldenburg, Germany, July 2003
- Keynote address ("An industrial perspective on intelligent hearing aids") at 2nd McMaster-Gennum Workshop on Intelligent Hearing Instruments, Niagara-on-the-Lake, ON, Sep 2001
- NIDCA/NASA/VA Hearing Aids Improvement Conference, May 1997
- Lucent Technologies, Bell Laboratories, November 1996
- AT&T Research, July 1996
- NSA (U.S. Government), June 1993
- Neural Network Workshop, Rutgers University, October 1992
- David Sarnoff Research Center, October 1991

Professional Activities (selection)

- Invited jury member for Open Technology Program (OTP) research proposals to Dutch Technology Foundation STW, Dec. 2010
- Invited DSP expert on IWT (Flemish Institute for Science and Technology) panel to evaluate candidate PhD proposals, Brussels, Nov. 2005 and May 2006
- Organizer/chair special session 'DSP for Intelligent Hearing Aids', ICASSP 2002, Orlando, FL, May 2002
- Publicity chair, Neural Networks for Signal Processing Workshop, Amelia island, Florida, 1997 and Cambridge, UK, 1998
- Session chair Non-linear Systems Identification, ICASSP96, Atlanta, GA, May 1996, and IEEE NNSP-98 Workshop, Cambridge, UK, September 1998
- (Elected) member of "IEEE Technical Committee on Neural Networks for Signal Processing Society", 1995-1998
- Invited researcher in government sponsored Robust Speech Processing Workshop, July-August 1993
- Member of various professional societies (e.g. IEEE, INNS)

Refereed Publications

IEEE Transactions on Signal Processing, IEEE Transactions on Neural Networks, NeuroComputing Journal, Neural Networks Journal, EURASIP Journal of Applied Signal Processing, Advances in Neural Information Processing Systems (NIPS) Conferences, ICASSP Conferences and others.

TU/e Univ. Activities

Teaching

- **Adaptive Information Processing**. Together with Tjalling Tjalkens, since spring 2005 I teach a core graduate class on the fundamentals of machine learning.
- **Machine Learning**. I organized a machine learning reading club for TU/e graduate students and GN ReSound staff. Fall 2004.

Research

My current research focusses on applications of Bayesian machine learning to personalization of hearing aid algorithms. In July 2006, together with Tom Heskes and Wouter Dreschler, we received a 650K euro grant from STW to pursue further research on *Personalization of Hearing Aids through Bayesian Preference Elicitation.*

Recent Student Supervision

- Joris Kraak, M.Sc. practical training project, *Optimization of a Spectral Noise Tracking Algorithm*, Dec. 2010
- Jianfeng Li, M.Sc.-thesis, *Acoustic scene-adaptive speech enhancement*, Aug. 2010
- Jianfeng Li, M.Sc.-project, *Spatial defect clustering on semiconductor wafers using image processing techniques*, Aug.-2009
- Xueru Zhang, P.D.Eng.-thesis: *Bayesian periodogram smoothing for speech enhancement*, Sep. 2008
- Rene Besseling, M.Sc.-project, *Gaussian processes in Bekesy audiometry*, June 2008
- Serkan Ozer, M.Sc.-thesis: *Bayesian linear regression for user-adaptive hearing aids*, Aug. 2007
- Ronnie van Loon, M.Sc.-thesis: *a Probabilistic Approach to Sound Classification*, June 2007.
- Anton Vakrushev, P.D.Eng.-thesis: *Interactive machine learning for Personalization of hearing aid algorithms*, Sep. 2006
- Jorik Caljouw, M.Sc. practical training on *PDA-based Interfacing to a real-time audio platform*, Dec. 2005.
- Paul Aelen, M.Sc. project, *Determination of the Intra Uterine Pressure with electrodes on the abdomen*, Dec. 2005.
- Job Geurts, M.Sc. practical training on *A PC-based real-time simulation platform for evaluating hearing aid algorithms*, Jun. 2005.

Care and Cure theme

I am actively participating in the development of the Care and Cure theme roadmap for the EE department (2008).

Personal

Born on June 28th 1962. Dutch citizen. Leisure interests: sports (triathlon, tennis, spinning instructor), and reading.

References

Dr. Jose C. Principe, Distinguished Professor of Electrical Engineering, (Ph.D. supervisor).
University of Florida, Gainesville, FL
e-mail `principe@synapse.ee.ufl.edu`

Other references on request.

Publications

Impact Factor

- 10 journal articles, 13 patents, >50 conference contributions with citation numbers (high to low) 146, 108, 69, 33, 33, 31, 30, 29, 21, 16, 14, 12, 11, 11, 10, 7, 7, ... ⇒ Hirsch-index = 12, Google Scholar, Feb-2011.
- (>60 unpublished technical reports (company confidential))

Journal Articles and Book Chapters

11. Rik Vullings et al. An Adaptive Kalman Filter for ECG Signal Enhancement, *IEEE Transactions on Biomedical Engineering*, vol.58, no.4, April 2011.
10. A. Ypma et al., On-line Personalization of Hearing Instruments, *EURASIP Journal on Audio, Speech, and Music Processing*, September 2008.
9. Tjeerd Dijkstra et al., The Learning Hearing Aid: Common-Sense Reasoning in Hearing Aid Circuits, The Hearing Review, issue October 2007. (cited by 5, GS1102 (=Google Scholar, 2011-02))
8. David Zhao et al., On-line Noise Estimation Using Stochastic-Gain HMM for Speech Enhancement, *IEEE Transactions on Audio, Speech and Language Processing*, vol.16, no.4, May 2008. (cited by 2, GS0808)
7. Jose Principe et al., Locally Recurrent Networks: The Gamma Operator, Properties and Extensions, invited book chapter in *Neural Networks and Pattern Recognition*, Omidvar and Dayhoff (eds.), Academic Press, 1997. (cited by 1, GS0907)
6. Bert de Vries, Short term memory structures for dynamic neural networks, book chapter in: *Artificial Neural Networks for Speech and Vision*, Richard Mammone (ed.), Chapman & Hall Ltd., 1994. (cited by 3, GS0810)
5. Bert de Vries and Jose Principe, The gamma model–A new neural network for temporal processing, *Neural Networks* vol. 5(4), pp. 565-576, 1992. (cited by 146, GS1102)
4. Jose Principe and Bert de Vries, The gamma filter–A new class of adaptive IIR filters with restricted feedback, *IEEE transactions on signal processing* vol. 41(2), pp. 649-656, 1992. (cited by 108, GS1102)
3. Bert de Vries, Temporal processing with neural networks-the development of the Gamma model, *Ph.D. dissertation*, University of Florida, 1991. (cited by 12, GS1102)
2. Joachim Gravenstein et al., Sampling intervals for clinical monitoring of variables during anesthesia, *Journal of clinical monitoring* vol 5(1), 1989. (cited by 30, GS1102)

1. Jan J. van der Aa, Bert de Vries and Joachim Gravenstein, Toward more sophisticated monitoring alarms, *Journal of clinical monitoring* 4 (2), 1986.

Patents

13. Bert de Vries et al., Efficient evaluation of hearing ability, submitted by GNR Ref.: P1669 EP, Albihns Ref.: P13304 US / P13303, April 2009.
12. Alexander Ypma et al., Asymmetric synchronization of hearing aid algorithms, submitted by GN ReSound, patent no. 09174982.0-2225, filed 4-Nov-2009.
11. Alexander Ypma et al., Learning control of hearing aid parameter settings, submitted by GN ReSound, filed 16-Mar-2007.
10. Bert de Vries and Alexander Ypma, Optimization of Hearing Aid Parameters, filed by GN ReSound, patent no. WO/2007/042043, 10/13/06.
9. David Zhao, Bastiaan Kleijn, Alexander Ypma and Bert de Vries, Method and Apparatus for Improved Estimation of Non-stationary Noise for Speech Enhancement, filed by GN ReSound, patent no. 06119399.1-224, 08/23/06
8. Bert de Vries and Rob de Vries, Fitting methodology and hearing prosthesis based on signal-to-noise ratio loss data, USA patent registered for GN ReSound, no. 20040047474, 03/11/2004.
7. L. Parra and B. de Vries, Method and apparatus for adaptive speech detection by applying a probabilistic description to the classification and tracking of signal components, patent registered for Sarnoff Corporation, LG Electronics, Inc., no. 6691087, 10-Feb. 2004. (cited by 3, GS1102)
6. Bert de Vries, Noise Spectrum Tracking for Speech Enhancement, patent registered for Sarnoff Corporation, no. US6289309, 9/11/2001. (cited by 29, GS1102)
5. J. Lubin et al., Method and apparatus for training a neural network to learn and use fidelity metric as a control mechanism, patent registered for Sarnoff Corporation, no. US6075884, 6/13/2000. (cited by 14, GS1102)
4. Bert de Vries, Method and apparatus for filtering signals using a gamma delay line based estimation of power spectrum, patent registered for Sarnoff Corporation, no. US6073152, 6/6/2000. (cited by 1, GS1102)
3. M. Brill, J. Lubin, B. de Vries, O. Finard, Method and apparatus for assessing the visibility of differences between two image sequences, patent registered for Sarnoff Corporation, no. US5974159, 10/26/1999. (cited by 33, GS1102)
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1. Bert de Vries and Jose Principe, An adaptive filter based on a recursive delay line, patent registered for University of Florida, no. 5,301,135, April 1994. (cited by 5, GS1102)

Conferences and Workshops

53. Petkov P. et al., Discrete Choice Models for Non-Intrusive Quality Assessment, *Interspeech 2011*, Florence, Italy, 2011
52. Rob de Vries et al., A software suite for automatic beamforming calibration, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2010
51. S.I. Mossavat et al., A Bayesian hierarchical mixture of experts approach to estimate speech quality, *QoMEX 2010*, Trondheim, Norway, June 2010
50. Jos Leenen and Bert de Vries, Current DSP and Machine Learning Trends in the Hearing Aids Industry, *IEEE Benelux Signal Processing Symposium: Signal Processing for Digital Hearing Aids*, Delft, NL, April 2010
49. Xueru Zhang et al., Bayesian periodogram smoothing for speech enhancement, *European Symposium on Artificial Neural Networks (ESANN-09)*, Bruges, April 2009
48. Adriana Birlutiu et al., Towards hearing aid personalization: preference elicitation from audiological data, *Scientific ICT-Research Event Netherlands (SIREN)*, Amsterdam, Sep. 2008
47. Tjeerd Dijkstra et al., HearClip: an Application of Bayesian Machine Learning to Personalization of Hearing Aids, Presentation at *Dutch Society for Audiology Meeting*, Sep. 2008
46. Bert de Vries, Fast Model-Based Fitting through Active Data Selection, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2008
45. Rolph Houben et al., Construction of a virtual subject response database to reduce subject testing, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2008
44. Bert de Vries et al., The Complexity of Hearing Aid Fitting, presented at *International Symposium on Auditory and Audiological Research 2007*, Helsingor, Denmark, August 2007
43. Jos Leenen et al., Learning Volume Control for Hearing Aids, presented at *International Symposium on Auditory and Audiological Research 2007*, Helsingor, Denmark, August 2007
42. Alexander Ypma et al., Bayesian Feature Selection for Hearing Aid Personalization, *MLSP-07*, Thessaloniki, Greece, 2007. (cited by 2, GS1102)
41. Adriana Birlutiu et al., Personalization of Hearing Aids through Bayesian Preference Elicitation, *NIPS workshop on User Adaptive Systems*, Whistler, BC, Canada, December 2006
40. Bert de Vries et al., Bayesian Machine Learning for Personalization of Hearing Aid Algorithms, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2006
39. Alexander Ypma, Bert de Vries and Job Geurts, Robust Volume Control Personalization from On-line Preference Feedback, *IEEE Int. Workshop on Machine Learning for Signal Processing*, Maynooth, Ireland, 2006. (cited by 4, GS1102)
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36. Alexander Ypma, Bert de Vries and Job Geurts, A learning volume control that is robust to user inconsistency, *The second annual IEEE BENELUX/DSP Valley Signal Processing Symposium*, Antwerp, March 2006
35. Paul Aelen et al., Electrohysterographic Estimation of the Intra-Uterine Pressure, *The second annual IEEE BENELUX/DSP Valley Signal Processing Symposium*, Antwerp, March 2006
34. Tom Heskes and Bert de Vries, Incremental Utility Elicitation for Adaptive Personalization, *The 17th Belgian-Dutch Conference on Artificial Intelligence*, Brussels, Belgium, October 2005. (cited by 6, GS1102)
33. Bert de Vries and Rob de Vries, An Integrated Approach to Hearing Aid Algorithm Design, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2004
32. Harald Pobloth et al., Speech Coding for Wireless Communication in the Hearing Aid Environment, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2004
31. Bert de Vries and Rob de Vries,An Integrated Approach to Hearing Aid Algorithm Design for Enhancement of Audibilit y, Intelligibility and Comfort, *IEEE Benelux Signal Processing Symposium*, Hilvarenbeek, Netherlands, April 2004. (cited by 4, GS1102)
30. Rob de Vries and Bert de Vries, Toward SNR-Loss Restoration in Digital Hearing Aids, *ICASSP 2002*, Orlando, FL, May 2002. (cited by 4, GS0801)
29. Bert de Vries, Jos Leenen, A Low Power Digital AGC Circuit for Dynamic Range Control of an A/D Converter, *International Hearing Aids Research (IHCON) Conference 2000*, Lake Tahoe (CA), August 2000
28. Lucas Parra, Clay Spence and Bert de Vries, Convolutive Blind Source Separation based on Multiple Decorrelation, *IEEE workshop on Neural Networks for Signal Processing VIII*, pp.23-32, Cambridge, UK, 1998. (cited by 69, GS1102)
27. Bert de Vries, Blind Signal Processing for Hearing Aids, *NIH Hearing Aids Improvement Conference*, Bethesda, MA, May 1997
26. Bert de Vries, Adaptive Gamma Filters for Miniature Hearing Aids, *NIH Hearing Aids Improvement Conference*, Bethesda, MA, May 1997
25. Bert de Vries, Adaptive rank filtering based on error minimization, *ICASSP-97*, Munich, April 1997
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23. Q. Lin et al., Robust distant-talking speech recognition, *ICASSP-96*, Atlanta,GA, May 1996. (cited by 16, GS1102)
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12. T. Oliveira a Silva et al., Generalized feedforward filters with complex poles, *Proceedings of the 1992 IEEE workshop on Neural Networks for Signal Processing*, Copenhagen, Denmark, 1992.
11. Jyh-Ming Kuo, Jose Principe and Bert de Vries, Prediction of chaotic time series using recurrent networks, *Proc. of the 1992 IEEE workshop on Neural Networks for Signal Processing*, 1992. (cited by 7, GS1102)
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