Measuring Performance and Intelligence of Intelligent Systems

Workshop Schedule

General Chair – Elena Messina
Program Chair – Alex Meystel

August 14 - 16

The Workshop opens in Lecture Room A, Bldg. 101

Afternoon Plenary Lecture will be conducted at Green Auditorium

N I S T
Gaithersburg, MD
2000

The Schedule of a Session

- Each Session is allotted 2 hours.
- It is expected that a speaker will use a slot of 25 minutes for his/her presentation (20 minutes) and answering questions (5 minutes).
- The remainder of time (20 minutes) should be used for a general discussion and combining the *Final Recommendations* of the Session.
- The Final Recommendations of all sessions will be integrated into *Final Recommendations of the Workshop*.
- The results of Each Day are discussed at the evening Plenary Discussion

1st Day, Monday, August the 14th

Lecture Room A
8.30 AM Introduction by Workshop Organizers : A. Meystel, J. Evans, E. Messina

8:45 AM J. Evans, E. Messina, The Present and The Future of Measuring Performance of Intelligent Systems

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PLENARY LECTURE – 9 AM – 10 AM - Lecture Room A

H. Szu, Machine IQ with Stable Cybernetic Learning With and Without a Teacher

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Coffee Break: 10 AM-10.30 AM

Sessions: 10.30 AM – 12.30 PM

Lecture Room A
I Day, morning A: Features of Industrial Intelligent Systems,
Co-Chairs: M. Cotsaftis, W. H. VerDuin

- M. W. Bailey, W. H. VerDuin, FIPER: An Intelligent System for the Optimal Design of Highly Engineered Products
- S. A. Wallace, J. E. Laird, K. J. Coulter, Examining the Resource Requirements of Artificial Intelligence Architectures
- C. Peterson, A Metric for Monitoring and Retaining Flight Software performance
- M. Cotsaftis, On Definition of Task Oriented System Intelligence

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Lecture Room B
I Day, Morning B: Features of Living Intelligent Systems
Co-Chairs: K. Bellman, C. Joslyn

- K. Bellman, Understanding and Its Behavioral Correlates"
- C. Joslyn, Toward Measures of Intelligence Based On Semiotic Control
- H. Sarjoughian, B. Zeigler, Model-based Design and Measurement of Intelligence
- T. Chmielewski, P. Kalata, Biometric Techniques: The Fundamentals of Evaluation

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Lecture Room C
I Day, Morning C: Special Issues of Evaluating Intelligence
Co-Chairs: R. Sanz, A. Wild

- R. Sanz, I. Lopez, Minds, MIPs, and Structural Feedback
- A. Wild, Using the Metaphor of Intelligence
- R. Garner, R. N. Bishop, Applied Applications for Mimetic Synthesis: The AAMS Project Summary
- H. M. Hubey, General Scientific Premises of Measuring Complex Phenomena

Lunch 12.30 PM – 2 PM – Back of Cafeteria

PLENARY LECTURE – 2 PM-3 PM - Green Auditorium

G. Saridis, Definition and Measurement of Machine Intelligence

Coffee Break: 3 PM-3.15 PM

Sessions: 3.15 PM – 5.15 PM

Lecture Room A
I Day, Afternoon A: Metrics and Comparison of Alternatives: General Issues
Co-Chairs: L. Pouchard, W. C. Stirling

- L. Pouchard, Metrics for Intelligence: the Perspective from Software Agents
- J. Spall, et al, Towards an Objective Comparison of Stochastic Optimization Approaches
- W. C. Stirling, R. L. Frost, Intelligence with Attitude
- S. Lee, W.-C. Bang, and Z. Z. Bien, Measure of System Intelligence: An Engineering Perspective

Lecture Room B
I Day, Afternoon B: Metrics and Comparison of Alternatives: Case Studies
Co-Chairs: R. Finkelstein, E. Grant

- E. Grant, G. Lee, Properties of Learning Knowledge Based Controllers
- V. Grishin, A. Meystel, Using Visualisation for Measuring Intelligence of Constructed Systems
- R. Finkelstein, A Method for Evaluating the IQ of Intelligent Systems
- L. Polyakov, In Defense of the Additive Form for Evaluating Vectors

PLENARY DISCUSSION - 5.15 PM – 6.15 PM Green Auditorium

Panel: K. Bellman, M. Cotsaftis, R. Finkelstein, E. Grant, C. Joslyn, C. Peterson, L. Pouchard, W. C. Stirling, A. Wild

8 PM – Meeting of the Advisory Board (at the Holiday Inn)

2nd Day, Tuesday, August the 15th

PLENARY LECTURE – 9 AM-10 AM - Green Auditorium

J. Albus, Features of Intelligence Required in Unmanned Autonomous Vehicles

Coffee Break: 10 AM-10.30 AM

Sessions: 10.30 AM – 12.30 PM

Lecture Room A
II Day, Morning A: Measuring performance
Co-Chairs: A. Sanderson, T. Samad

- T. Samad, Technologies for Engineering Autonomy and Intelligence
- A. Sanderson, Minimal Representation Size Metrics for Intelligent Robotic Systems
- J. Zhang, A Formal Method to the Performance Metrics for Engineering Systems
- R. Yager, A Hierarchical Framework for Constructing Intelligent Systems Metrics

Lecture Room B
II Day, Morning B: Modeling and Measuring Machine Intelligence
Co-Chairs: P. Davis, T. Whalen

- P. Davis, Exploratory Analysis Enabled by Multiresolution, Multiperspective Modeling
- M. Jabri, Measuring intelligence: a neuromorphic perspective
- I. Nourbakhsh , Two measures for measuring the `intelligence' of human-interactive robots in contests and in the real world: perceptiveness and expressiveness
- T. Whalen, What is the Value of Intelligence and How Can It Be Measured?

Lecture Room C
II Day, Morning C: Evaluating Factors of Intelligence in Systems
Co-Chairs: J. Hernandes-Orallo, C. Peterson

- J. Hernandes-Orallo, On the Computational Measurement of Intelligence Factors
- A. Wild, Heterogeneous Computing
- J. Bryson, et al, Hypothesis Testing for Complex Agents
- T. Balch, Hierarchic Social Entropy: An Information Theoretic Measure of Robot Group Diversity

Lunch 12.30 PM – 2 PM – Back of Cafeteria

PLENARY LECTURE – 2 PM – 3 PM - Green Auditorium

S. Grossberg, Some Constraints on Intelligent Systems:
Autonomous Computation in a Changing World

Coffee Break – 3 PM – 3.15 PM

Sessions: 3.15 PM – 5.15 PM

Lecture Room A
II Day, Afternoon A: Measuring of Intelligence of Multiagent Networks
Chair and Organizer: S. Phoha

- R. R. Brooks, STIGMERGY: A measure of intelligence for emergent distributed behaviors
- S. Phoha, D. Friedlander, Goodness of Fit Measures for Intelligent Behaviors of Interacting Machines
- M. E. Cleary, M. Abramson, M. B. Adams, S. Kolitz. Metrics for Embedded Collaborative Intelligent Systems
- D. Friedlander, S. Phoha, A. Ray, Domain Independent Measures of Intelligent Control
- S. Perraju Tolety, G. Uma, On Measuring Intelligence in Multi-Agent Systems

Lecture Room B
II Day, Afternoon B: Evaluating Intelligent Systems by Testing and Competition: Benchmarks
Co-Chairs and Organizers: A. Schultz, R. Murphy

- A. Schultz, Evolution of Metrics for Mobile Robots
- A. Jacoff, E. Messina, J. Evans, A Standard Test Course for Urban Search and Rescue Robots
- R. Murphy, J. Casper, M. Micire, J. Hyams, "Assessment of the NIST Standard Test Bed for Urban Search and Rescue Competitions"
- T. Balch, Performance/N is the Wrong Metric for Multirobot Teams
- S. K. Agrawal, A. M. Ferreira, S. Pledgie, Performance Evaluation of Robotic Systems: A Proposal for a Benchmark problem

Lecture Room C
II Day, Afternoon C: Measuring Intelligence of Distributed Systems
Co-Chairs: R. Fakory, W. J. Davis

- W. J. Davis, Evaluating Performance of Distributed Intelligent Control System
- R. Fakory, M. Jahangiri, Real Time Distributed Expert System for Automated Monitoring of Key Monitors in Hubble Space Telescope
- X. Qin, A. E. Aktan, Distributed Internet-Based Multi-Agent Intelligent Infrastructure System
- D. P. Gravel, W. S. Newman, Flexible Robotic Assembly

Plenary Discussion- 5.15 PM – 6.15 PM - Green Auditorium

Panel: T. Balch, P. Davis, W. J. Davis, R. Fakory, J. Hernandes-Orallo, R. Murphy, S. Phoha, T. Samad, A. Sanderson, A. Schultz, T. Whalen

Evening: COCKTAILS AND B A N Q U E T
– 6.45 PM at the Holiday Inn

L. Zadeh,
Banquet speech "The Search for Metrics of Intelligence -- A Critical View."

3rd Day, Wednesday, August the 16th

PLENARY LECTURE – 9 AM – 10 AM - Green Auditorium

W. Freeman, The neurodynamics of intentionality in animal brains provides a basis for constructing devices that are capable of intelligent behavior

Coffee Break: 10 AM-10.30 AM

Sessions: 10.30 AM – 12.30 PM

Lecture Room A
III Day, Morning A: Measuring Intelligence Taking in Account Linguistic, Psychological and Biological Factors
Co-Chairs: L. Reeker, A. Meystel

- L. Reeker, Theoretical Constructs for Measurement Performance and Intelligence
- A. Meystel, Generalizing Natural Language Representations for Measuring the Intelligence of Systems
- P. Wang, Machine Intelligence Ranking
- A. Treister-Goren, J. Dunietz, The AI Language Development Metric

Lecture Room B
III Day, Morning B: Measuring Intelligence of Systems with Autonomy and Mobility
Co-Chairs: G. S. Sukhatme, J. Weng

- G. S. Sukhatme, Measuring Mobile Robots Performance: Approaches and Pitfalls
- L. E. Parker, Evaluating Success in Autonomous Multi-robot Teams: Experience of ALLIANCE Architectures Implementation

- A. Lacaze, S. Balakirsky, Search Graph Formation for Minimizing the Complexity of Planning
- J. Weng, Automatic Mental Development and Performance Metrics for Intelligent Systems

Lunch 12.30 PM – 2 PM - Back of Cafeteria

PLENARY LECTURE – 2 PM – 3 PM - Green Auditorium

A. Meystel , Evolution of Intelligent Systems Architectures: What Should Be Measured

Coffee Break – 3 PM – 3.15 PM

Afternoon Session – 3.15 PM – 5.15 PM

PLENARY PANEL - 3:15 PM - 5:15 PM - Green Auditorium

Perspectives of Governmental Programs on Measuring Intelligence
Panel organizers – J. Albus, J. Blitch, J. Evans

- J. Albus, NIST
- J. Blitch, DARPA
- B. Bialczak, SESI, Fort Knox
- J. Evans, NIST
- S. Sastry, DARPA
- C. Shoemaker ARL,
- M. Swinson, DARPA
- C. Weisbin, NASA

PLENARY PANEL – 5: 15 PM – 6:15 PM - Green Auditorium

General Discussion of the Workshop Results

Panel: J. Albus, J. Evans, E. Messina, A. Meystel, L. Reeker, G. S. Sukhatme, J. Weng

The Meeting Closes: 6.15 PM