## Contents IMIA Yearbook of Medical Informatics 2019

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>President’s Statement</td>
<td>C. U. Lehmann President’s Statement</td>
<td>1</td>
</tr>
<tr>
<td>Editorial</td>
<td>K. Fultz Hollis, L. F. Soualmia, B. Séroussi</td>
<td>3</td>
</tr>
<tr>
<td>Editorial</td>
<td>Artificial Intelligence in Health Informatics: Hype or Reality?</td>
<td>3</td>
</tr>
<tr>
<td>80th Birthday</td>
<td>M. J. Ball, D. Bergemann, A. Hasman, R. Haux, A. T. McCray</td>
<td>5</td>
</tr>
<tr>
<td>80th Birthday</td>
<td>On the 80th Birthday of Jan van Bemmel</td>
<td>5</td>
</tr>
<tr>
<td>IMIA Board Paper</td>
<td>On the Right to Science: Recommendations of Selection Criteria for IMIA Scientific Meetings</td>
<td>11</td>
</tr>
<tr>
<td>Keynote</td>
<td>E. Coiera</td>
<td>14</td>
</tr>
<tr>
<td>Keynote</td>
<td>The Price of Artificial Intelligence</td>
<td>14</td>
</tr>
</tbody>
</table>

### Special Section: Artificial Intelligence in Health: New Opportunities, Challenges, and Practical Implications

| Survey                               | F. Wang, A. Preininger                                                | 16   |
| Survey                               | AI in Health: State of the Art, Challenges, and Future Directions     | 16   |
| Working Group Contributions          | L. Balkanyi, R. Cornet                                                | 27   |
| Working Group Contributions          | The Interplay of Knowledge Representation with Various Fields of Artificial Intelligence in Medicine | 27   |
| Working Group Contributions          | Role of Artificial Intelligence within the Telehealth Domain           | 35   |
| Working Group Contributions          | Artificial Intelligence in Primary Health Care: Perceptions, Issues, and Challenges | 41   |
| Working Group Contributions          | C. Paton, S. Kobayashi                                               | 47   |
| Working Group Contributions          | An Open Science Approach to Artificial Intelligence in Healthcare      | 47   |
| Synopsis                             | G. Jackson, J. Hu                                                     | 52   |
| Synopsis                             | Artificial Intelligence in Health in 2018: New Opportunities, Challenges, and Practical Implications | 52   |
| Best Paper Selection                 | Content summaries of:                                                 | 55   |
Section 1: Health Information Management

Survey
M. H. Stanfill, D. T. Marc
Health Information Management: Implications of Artificial Intelligence on Healthcare Data and Information Management 56

Synopsis
M. Bloomrosten, E. S. Berner
Findings from the 2019 International Medical Informatics Association Yearbook Section on Health Information Management 65

Best Paper Selection
Content summaries of:
- Cui L, Xie X, Shen Z. Prediction task guided representation learning of medical codes in EHR. J Biomed Inform 2018;84:1-10
- Li F, Liu W, Yu H. Extraction of information related to adverse drug events from electronic health record notes: design of an end-to-end model based on deep learning. JMIR Med Inform 2018;6(4):e12159
- Qiu JX, Yoon H-J, Fearn PA, Tourassi GD. Deep learning for automated extraction of primary sites from cancer pathology reports. IEEE J Biomed Health Inform 2018;22(1):244-51

Section 2: Human Factors and Organizational Issues

Survey
P. Carayon, P. Hoonakker
Human Factors and Usability for Health Information Technology: Old and New Challenges 71

Synopsis
S. Pelayo, Y. Senathirajah
Human Factors and Sociotechnical Issues 78

Best Paper Selection
Content summaries of:
Section 3: Clinical Information Systems

Survey
C. Combi, G. Pozzi
Clinical Information Systems and Artificial Intelligence: Recent Research Trends 83

Synopsis
W. O. Hackl, A. Hoerbst
Managing Complexity: From Documentation to Knowledge Integration and Informed Decision 95

Best Paper Selection

Content summaries of:


Parr SK, Shotwell MS, Jeffery AD, Lasko TA, Matheny ME. Automated mapping of laboratory tests to LDINC codes using noisy labels in a national electronic health record system database. J Am Med Inform Assoc 2018;25(10):1292-300


Section 4: Sensor, Signal and Imaging Informatics

Survey
C. Hoog Antink, S. Lyra, M. Paul, X. Yu, S. Leonhardt
A Broader Look: Camera-Based Vital Sign Estimation across the Spectrum 102

Synopsis
W. Hsu, C. Baumgartner, T. Deserno
Advancing Artificial Intelligence in Sensors, Signals, and Imaging Informatics 115

Best Paper Selection

Content summaries of:


### Section 5: Decision Support

#### Survey

**S. Montani, M. Striani**  
Artificial Intelligence in Clinical Decision Support: a Focused Literature Survey  
120

#### Working Group Contribution

Artificial Intelligence in Clinical Decision Support: Challenges for Evaluating AI and Practical Implications  
128

#### Synopsis

**V. Koutkias, J. Bouaud**  
Contributions on Clinical Decision Support from the 2018 Literature  
135

#### Best Paper Selection

138

**Ray S, McEvoy DS, Aaron S, Hickman TT, Wright A.** Using statistical anomaly detection models to find clinical decision support malfunctions. J Am Med Inform Assoc 2018 Jul 1;25(7):862-71  
138

138


### Section 6: Knowledge Representation and Management

#### Survey

**J. P. Bona, F. W. Prior, M. N. Zozus, M. Brochhausen**  
Enhancing Clinical Data and Clinical Research Data with Biomedical Ontologies - Insights from the Knowledge Representation Perspective  
140

#### Synopsis

**F. Dhombres, J. Charlet**  
Formal Medical Knowledge Representation Supports Deep Learning Algorithms, Bioinformatics Pipelines, Genomics Data Analysis, and Big Data Processes  
152

#### Best Paper Selection

156

**Le KK, Whiteside MD, Hopkins JE, Gannon VPJ, Laing CR.** Spfy: an integrated graph database for real-time prediction of bacterial phenotypes and downstream comparative analyses. Database (Oxford) 2018;2018:1-10  
156

**Osumi-Sutherland DJ, Ponta E, Courtot M, Parkinson H, Badi L.** Using OWL reasoning to support the generation of novel gene sets for enrichment analysis. J Biomed Semantics 2018;9(1):10  
156

156
Section 7: Consumer Health Informatics and Education

Survey
N. Wickramasinghe
Essential Considerations for Successful Consumer Health Informatics Solutions 158

Working Group Contribution
K. Denecke, E. Gabarron, R. Grainger, S. T. Konstantinidis, A. Lau, Q. Rivera-Romero, T. Miron-Shatz, M. Merolli
Artificial Intelligence for Participatory Health: Applications, Impact, and Future Implications 165

Synopsis
A. Y. S. Lau, P. Staccini
Artificial Intelligence in Health: New Opportunities, Challenges, and Practical Implications 174

Best Paper Selection
Content summaries of:

Section 8: Bioinformatics and Translational Informatics

Survey
C. Overby Taylor, P. Tarczy-Hornoch
Personalized Medicine Implementation with Non-traditional Data Sources: A Conceptual Framework and Survey of the Literature 181

Synopsis
M. Smaïl-Tabbone, B. Rance
Contributions from the 2018 Literature on Bioinformatics and Translational Informatics 190

Best Paper Selection
Content summaries of:
Section 9: Clinical Research Informatics

Survey
M. Cuggia, S. Combes
The French Health Data Hub and the German Medical Informatics Initiatives: Two National Projects to Promote Data Sharing in Healthcare
195

Synopsis
C. Daniel, D. Kalra
Clinical Research Informatics: Contributions from 2018
203

Best Paper Selection
Content summaries of:
206
206
206
207

Section 10: Natural Language Processing

Survey
M. Conway, M. Hu, W. W. Chapman
Recent Advances in Using Natural Language Processing to Address Public Health Research Questions Using Social Media and Consumer-Generated Data
208

Synopsis
N. Grabar, C. Grouin,
A Year of Papers Using Biomedical Texts: Findings from the Section on Natural Language Processing of the IMIA Yearbook
218

Best Paper Selection
Content summaries of:
223
223

Section 11: Public Health and Epidemiology Informatics

Survey
A. Rodríguez-González, M. Zanin, E. Menasalvas-Ruiz
Public Health and Epidemiology Informatics: Can Artificial Intelligence Help Future Global Challenges? An Overview of Antimicrobial Resistance and Impact of Climate Change in Disease Epidemiology
224

Synopsis
R. Thiébaut, S. Cossin
Artificial Intelligence for Surveillance in Public Health
232

Best Paper Selection
Content summaries of:
235
235
Wakamiya S, Kawai Y, Aramaki E. Twitter-Based Influenza Detection After Flu Peak via Tweets With Indirect Information: Text Mining Study. JMIR Public Health Surveill 2018 Sep 25;4(3):e65
235
Section 12: Cancer Informatics

Synopsis

J. L. Warner, D. A. Patt
Cancer Informatics in 2018: The Mysteries of the Cancer Genome Continue to Unravel, Deep Learning Approaches the Clinic, and Passive Data Collection Demonstrates Utility

Content summaries of:

Best Paper Selection


Research & Education

G. Haoran, E. Bazakidi, N. Zary
Serious Games in Health Professions Education: Review of Trends and Learning Efficacy

History of Medical Informatics

C. A. Kulikowski
Beginnings of Artificial Intelligence in Medicine (AIM): Computational Artifice Assisting Scientific Inquiry and Clinical Art — with Reflections on Present AIM Challenges

E. H. Shortliffe
Artificial Intelligence in Medicine: Weighing the Accomplishments, Hype, and Promise
## Information on IMIA
- Welcome to IMIA
- Honorary Fellows
- IMIA Member Societies
- Institutional Members
- Addresses of IMIA Member Societies

## Information on IMIA Regions
- Information on APAMI (Asia Pacific Association for Medical Informatics)
- Information on Helina (African Region)
- Information on MENAHIA (Middle East and North African Association for Health Informatics)
- Information on NAMI (North-American Medical Informatics)
- Information on EFMI (European Federation For Medical Informatics)

## Miscellaneous
- Contributors
- Reviewers
- IMIA Yearbook Special Topics