

## PACIFIC SYMPOSIUM ON BIOCOMPUTING 2018

2018 marks the 23rd Pacific Symposium on Biocomputing (PSB). The original founders of PSB (Hunter & Klein) chose the term “Biocomputing” in 1996 in order to be as broad as possible—a wise decision as bioinformatics, clinical informatics, medical informatics, biomedical informatics, biomedical data science, and other terms (computational intelligence, artificial intelligence, data mining, machine learning, for example) have also gone in and out of style. Of course, each of these has its own connotation and there is no problem with a proliferation of useful and descriptive words. The anthropologist Franz Boas studied the Inuit Eskimos and commented on the large number of words they had for snow (New Scientist, 1/14/2013, “There really are 50 Eskimo words for ‘snow’)—it was because snow was important to them and they needed to describe many different subtle variations. We in Biocomputing also like to (and sometimes need to) make distinctions between different approaches and technologies to analyzing biological and medical data, so no word is perfect. In fact, “Biocomputing” is not a particularly preferred word in current parlance and a Google search for it produces results that might be called anemic. In fact, biocomputing engenders some confusion—does it mean computing *with* biological matter or computing *about* biology? Who knows—PSB 2018 may be dominated by biological computers. In any case, the term Biocomputing has served the conference well—it is just ambiguous enough to allow us to include whatever makes sense. The session organizers critically evaluate trends in the field and bring exciting and emerging new branches of Biocomputing in their proposals, and the organizers get to decide which ones to feature. This year is no exception, with a variety of new and old topics from Biocomputing.

The mission of PSB is to provide a forum for the best *emerging* science in Biocomputing, providing both formal and informal mechanisms for scientific communication. PSB depends on the community to define emerging areas in biomedical computation. Its sessions are usually conceived at the previous PSB meeting as people discuss trends and opportunities for new science. The typical program includes sessions that evolve over two to three years as well as entirely new sessions. This year we revisit topics such as precision medicine, pattern matching and text-mining, while nurturing emerging interest in genomic drug discovery, open science, imaging genomics, and the interpretation of noncoding DNA.

In addition to being published by World Scientific and indexed in PubMed, the proceedings from all PSB meetings are available online at <http://psb.stanford.edu/psb-online/>. PSB has 1066 papers listed in PubMed (as of today). These papers are routinely cited in archival journal articles and often represent important early contributions in new subfields—many times before there is an established literature in more traditional journals; for this reason, many papers have garnered hundreds of citations. The Twitter handle PSB 2018 is @PacSymBiocomp and the hashtag this year will be #psb18.

The efforts of a dedicated group of session organizers have produced an outstanding program. The sessions of PSB 2018 and their hard-working organizers are as follows:

### **Applications of Genetics, Genomics and Bioinformatics in Drug Discovery**

Richard Bourgon, Rick Dewey, Zhengyan Kan, and Dan Li

### **Challenges of Pattern Recognition in Biomedical Data**

Anurag Verma, Anna Basile, Marta Byrska-Bishop, Christian Darabos, and Shefali Setia Verma

### **Democratizing Health Data for Translational Research**

Philip Payne, Nigam Shah, Jessie Tenenbaum, and Lara Mangravite

### **Imaging Genomics**

Heng Huang, Junzhou Huang, Kun Huang, Li Shen, Paul M. Thompson, and Lin Yang

### **Precision Medicine: from diplotypes to disparities towards improved health and therapies**

Bruce Aronow, Steven E. Brenner, Dana C. Crawford, Joshua C. Denny, and Alexander A. Morgan

## **Reading Between the Genes: Computational Models to Discover Function and/or Clinical Utility from Noncoding DNA**

Yves Lussier, Maricel Kann, Jason Moore, Kenneth Ramos, Joanne Berghout, and Francesca Vitali

## **Text Mining and Visualization for Precision Medicine**

Graciela Gonzalez, Casey Greene, Hongfang Liu, and Abeed Sarker

We are also pleased to present four workshops in which investigators with a common interest come together to exchange results and new ideas in a format that is more informal than the peer-reviewed sessions. For this year, the workshops and their organizers are:

## **Diversity and Disparity in Biomedical Informatics**

Philip R.O. Payne, William M. Southerland, S. Joshua Swamidass, Laura Wiley, and ClarLynda Williams-DeVane

## **Integrating Community-level Data Resources for Precision Medicine Research**

Dana C. Crawford and William S. Bush

## **Machine Learning and Deep Analytics for Biocomputing: Call for Better Explainability**

Dragutin Petkovic, Lester Kobzik, Christopher Re

## **Methods for Examining Data Quality in Healthcare Integrated Data Repositories**

Vojtech Huser, Michael Kahn, and Jeffrey Brown

We thank our keynote speakers Carlos Bustamante (Science keynote) and Jennifer Wagner (Ethical, Legal and Social Implications keynote).

Tiffany Murray has managed the peer review process and assembly of the proceedings since 2003, and also plays a key role in many aspects of the meeting. We are grateful for the support of the Institute for Computational Biology, a collaborative effort of Case Western Reserve University, the Cleveland Clinic Foundation, and University Hospitals; the Institute *for* Informatics (I<sup>2</sup>), Washington University in St. Louis, School of Medicine; and Pfizer for their support of PSB 2018. We also thank the National Institutes of Health<sup>1</sup> and the International Society for Computational Biology (ISCB) for travel grant support. The research parasite and symbiont awards benefit by support from: GigaScience, Scientific Data, Springer Nature, Jeff Stibel, Mr. and Mrs. Stephen Canon, and Drs. Casey and Anna Greene.

We are particularly grateful to the onsite PSB staff Al Conde, Ryan Whaley, BJ Morrison-McKay, Cynthia Paulazzo, Jackson Miller, Kasey Miller, and Paul Murray for their assistance. We also acknowledge the many busy researchers who reviewed the submitted manuscripts on a very tight schedule. The partial list following this preface does not include many who wished to remain anonymous, and of course we apologize to any who may have been left out by mistake.

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We look forward to a great meeting once again. Aloha!

Pacific Symposium on Biocomputing Co-Chairs,  
October 15, 2017

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## Thanks to the reviewers...

Finally, we wish to thank the scores of reviewers. PSB aims for every paper in this volume to be reviewed by three independent referees. Since there is a large volume of submitted papers, paper reviews require a great deal of work from many people. We are grateful to all of you listed below and to anyone whose name we may have accidentally omitted or who wished to remain anonymous.

Vida Abedi	Suiwang Ji	Li Shen
Melinda Aldrich	Kenneth Jung	Marina Sirota
Gil Alterovitz	Anne Justice	Gregory Sliwoski
Vinayagam Arunachalam	Zhengyan Kan	Sandra Smieszek
Chloe-Agathe Azencott	Sarvnaz Karimi	Yang Song
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Brett Beaulieu-Jones	Ramakanth Kavuluru	Hanna Suominen
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William Bush	Robert Kueffner	Nathan Tintle
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Weidong Cai	Samir Lal	Anna Tyler
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Yin Hoon Chew	Haiquan Li	Rohit Vashisht
Keith Ching	Hongyang Li	Olivia Veatch
Brian Cole	Ruowang Li	Sudha Veturi
Jessica Cooke Bailey	Hai Lin	Francesca Vitali
Mark Craven	Hongfang Liu	Chen Wang
Dana Crawford	Jingyu Liu	Junwen Wang
David Crosslin	Sijia Liu	Xiaoqian Wang
Ying Ding	Tianming Liu	Yalin Wang
Lei Du	Gang Luo	Jeremy Warner
Jian Fang	Yves Lussier	Vivian West
Ruogu Fang	Meng Ma	Scott Williams
Di Feng	Shannon McWeeney	Chunlei Wu
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Jason Fries	Diego Molla	Jun Xu
Lana Garmire	Sean Mooney	Rong Xu
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Anthony Gitter	Matt Oetjens	Xiaohui Yao
Benjamin Glicksberg	Randy Olson	Meliha Yetisgen
Rachel Goldfeder	Patryck Orzechowski	Kun Yu
Jean-Philippe Gourdine	Casey Overby	Yong Yue
Casey Greene	Shraddha Pai	Baohong Zhang
Jacob Hall	Chetanya Pandya	Chi Zhang
Yangyang Hao	Michael Paul	Daoqiang Zhang
Steve Hart	Philip Payne	Shaoting Zhang
Jon Hill	Stephen Pfohl	Yan Zhang
Joshua Hoffman	Hoifung Poon	Yanfei Zhang
Brittany Hollister	Nicole Restrepo	Dajiang Zhu
Ting Hu	Dingyao Ruo	Xiaotong Zhu
Junzhou Huang	Satya Sahoo	Daniel Ziemek
Jake Hughey	Abeed Sarker	Pascal Zille
Wendy Ingram	Matthew Scotch	
Janina Jeff	Nigam Shah	