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Headline: Network Verification Challenge opens a new chapter for sbv IMPROVER

Byline: n/a

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The *Network Verification Challenge* – a unique initiative that provides scientists with a powerful new methodology for defining and verifying biological networks – opens today for submissions from the global scientific community. The Challenge uses a crowd-verification process to fine-tune and verify sophisticated biological networks. The resulting models represent the current status of scientific knowledge as related to a given set of networks, and provide a framework by which other biological networks can be visualized, expanded and verified.¹

"The *Network Verification Challenge* is uniquely placed to help us generate accurate, comprehensive and reliable models of biological networks," said Professor Martin Hofmann-Apitius, Head of Department of Bioinformatics at the Fraunhofer Institute for Algorithms and Scientific Computing SCAI, which developed part of the online platform that Challenge participants use to work on the networks. "This is an exciting new approach to network verification which has a number of implications, including the potential to provide an accelerated mechanism for the dissemination and validation of scientific knowledge, better maps of disease and improvements to therapeutic discovery and development."

The Challenge is part of the sbv IMPROVER project (**s**ystems **b**iology **v**erification: **I**ndustrial **M**ethodology for **P**ROcess **V**erification in **R**esearch), a collaborative initiative by IBM Research and Philip Morris International R&D which is designed to develop a robust, transparent and practical process for assessing complex scientific data. Within this framework, it also provides an approach for the verification of systems biology data and thus contributes in a variety of ways to improvements in human healthcare and other scientific and industrial areas. The *Network Verification Challenge* also involves Selventa, a personalized healthcare company pioneering the analysis of Big Data to unravel the complexity of disease. Selventa has played an important role in the development of the biological networks used in this challenge and also developed the software that allows visualization of the models.

"The sbv IMPROVER project is a truly unique initiative which is addressing some of the most fundamental issues facing the scientific community today, including: how can we cope with the explosive growth of data confidently, thoroughly and practically," said Dr David De Graaf,

President and CEO of Selventa. "By providing high-quality data sets to any scientist who wishes to look at them, openly and for free, and then asking them to scrutinize that data as part of the crowd, we are helping to forge the way towards a more transparent, collaborative and robust framework in which scientific research is conducted."

Participants in the *Network Verification Challenge* have the opportunity to work on 50 biological networks based on 75,000 individual pieces of scientific evidence. In total, the networks comprise approximately 2,000 nodes and 2,500 edges.

The Challenge consists of five phases:

1. Initial biological network models (related to human lung disease) are constructed based on literature and data-driven hypotheses. These models are encoded in Biological Expression Language (BEL), a human-readable and machine-computable language that captures causal and correlative relationships between biological entities.
2. Challenge participants are asked to enhance and/or verify the network models using a high-performance online platform. This process is set-up as a collaborative competition where points are awarded for various actions which contribute to the improvement of the models.
3. The contributions made by the participants will be carefully reviewed by the sbv IMPROVER project team against the supporting evidence provided. The most controversial edges (i.e., those that did not obtain a consensus from the community in phase two) will be selected for further review and discussion in phase four - a networking jamboree.
4. The participants that contributed most effectively in phase two will be invited to participate in an international networking jamboree session (planned for 18-20 March 2014 in Montreux, Switzerland). This will enable discussion of controversial edges and a simultaneous review of the scientific evidence with recognized experts. The objective of the jamboree is to reach a consensus among the experts of how best to formulate the network models.
5. The verified networks models are then shared with the scientific community.

Challenge participants can benefit from enhanced recognition amongst their peers by gaining points based on the submission of actions which are then verified by other challenge participants. Participants will also have early access to curated network models of signaling pathways, downloadable networks for participants who perform a certain number of actions (which are likely to help scientists generate new hypotheses for their own research) and early expertise in BEL, which is increasingly being adopted as a biological syntax conducive to computational manipulation. There is no financial reward for this challenge, although top participants may be eligible to receive a travel bursary to attend the jamboree session to discuss controversial edges. Travel bursaries will be funded by Philip Morris International.

The *Network Verification Challenge* is the third in a series of four challenges in sbv IMPROVER. The first, the *Diagnostic Signature Challenge*, asked participants to identify robust diagnostic signatures across four disease areas. The second, the *Species Translation Challenge*, sought to refine understanding of the limits of rodent models for predictors of human biology. Results of the *Species Translation Challenge* will be presented at the sbv IMPROVER Symposium in Athens, Greece (29-31 October 2013).

The *Network Verification Challenge* is open to scientists from commercial entities as well as academic and research institutions. Submissions will be accepted through to February 2014. To take part and for more information about the sbv IMPROVER project, please visit <http://www.sbvimprover.com>.

References

1. sbv IMPROVER project team. On crowd-verification of biological networks. Bioinformatics and Biology Insights. In press.

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