American Society for Quality (www.asq.org) – Washington DC and Maryland Metro, Section 509 (www.asq509.org)

Biomed/Biotech Special Interest Group (SIG) Meeting (http://www.asq509.org/ht/d/sp/i/31557/pid/31557)

"How Do Biological Neural Networks Encode, Learn, Memorize, Recall and Generalize as A Learning Machine?"

To be presented by

James Tin-Ho Lo, PhD
Professor
Department of Mathematics and Statistics
University of Maryland Baltimore County (UMBC)

Thursday, April 20, 2017

6:00 – 6:20 PM – Networking; Pizza/drink
6:20 – 8:45 PM – Program
8:45 – 8:55 PM – Door-prizes drawing; Networking

Online Registration site: http://www.asq509.org/ht/d/DoSurvey/i/35817
Open to Public –
> **$5:** non-ASQ members to cover pizza/drink cost;
> **Free:** ASQ members, veterans, senior citizens, past speakers, US PHS Commissioned Corp officers, teachers, students, interns, residents, postdocs, FDA Commissioner's Fellows, MJ-DC members, NTUAADC members, CAPA members, NTMUADC members, CKUAADC members, NTHUAADC members, NJTUAADC members, CCACC volunteers/employees, FAPAC members, CBA members, AAGEN members, NCARSQA members, OCA-DC members, AAMB members, ACAP members, DC Leaders Club members, BioTrain volunteers, and current job-seekers

Location: Kelly's Deli Conference Center, 7529 Standish Place, Rockville (Derwood, for GPS users), MD 20855

Registration Deadline: Please register by *Thursday noon, April 20, 2017.*
Question: Please contact Dr. C.J. George Chang, Chair of Biomed/Biotech SIG, ASQ509; gchang2008@yahoo.com or 240-793-8425 (cell).

Driving directions: **By Cars:** From **I-270** (N or S bound): Take Exit 9A and exit from the FIRST right exit; turn left (east) onto Shady Grove Dr.; turn right (south) onto Rockville Pike (**Route 355**); turn left (east) onto East Gude Dr.; turn left (north) immediately onto Crabb's Branch Dr.; turn left (west) immediately onto Standish Place. The first building on your right side is 7519 Standish Place; open parking). The venue is on the first floor of 7529 Building with its external entrance opposite to the left side of 7519 building main entrance. **By Metro trains**: Off from Red Line **Shady Grove Station**, and take RideOn **Route 59 TOWARD ROCKVILLE** and get off from "**Calhoun Place**" stop. Standish Place is next to the Bus stop. Our venue is within 2 min of walking distance from the stop.

Summary

A computational model of biological neural networks will be presented to answer the above question. It is the only single computational model that answers eight long-standing holy-grail questions in neuroscience and is believed to be the common cortical algorithm long hypothesized.

As a learning machine, it is the only one that performs "photographic learning" or "maximal generalization". It is also the only multilayer network (with or without feedback connections) that is capable of unsupervised learning.

The computational model provides a large number of research opportunities for understanding the brain, developing intelligent and cognitive machines, processing big data and possibly helping find genetic causes of diseases.

Speaker's Bio: James Ting-Ho Lo, PhD

Dr. James Ting-Ho Lo is a **Professor** in the Department of Mathematics and Statistics at University of Maryland Baltimore County (UMBC). He received the PhD degree from the University of Southern California and was a **Postdoctoral Research Associate** at Stanford and Harvard University. His research interests have included optimal filtering, system control and identification, active noise and vibration control, and computational intelligence. In 1992, he solved the long-standing notorious problem of optimal nonlinear filtering in its most general setting and obtained a best paper award.

Subsequently, he conceived and developed adaptive neural networks with long- and short-term memories, accommodative neural network for adaptive processing without online processor adjustment, and robust/adaptive neural networks with a continuous spectrum of robustness; which constitute an effective systematic general approach to robust or/and adaptive processing for system control/identification/estimate ion and signal processing.

He has been developing a convexification method for avoiding nonglobal minima in data fitting (e.g., training neural networks and estimating regression models), which is ready for effective application and is nearing a complete solution of the long-standing notorious "local minimum problem", a main obstacle in data fitting.

In recent years, Dr. Lo has also been developing a low-order model of biological neural networks. The model comprises biologically plausible models of axonal/dendritic trees, synapses, spiking/nonspiking somas, unsupervised/supervised learning mechanisms, a maximal generalization scheme, and feedbacks with different delay duration; which integrate into a biologically plausible learning/retrieving algorithm and answer numerous fundamental questions in neuroscience.