Xiaowei Song

online CV: http://restfmri.net/dawnsong, Google scholar CV

From June 2013, being a part-time NeuroImaging programmer
for Dr. Todd in Northwestern University.

From February 2013, being a Guest Researcher at NIH
under Prof. Yihong Yang (NIDA, http://irp.drugabuse.gov/Yang.php).
under Prof. Charles Bradberry (NIDA)

Until August 2012 when I moved to
Baltimore of U.S., was an assistant researcher under
Prof. Ping Zhu (http://sourcedb.cas.cn/sourcedb_ibp_cas/en/eibpexport/200904/t20090403_45225.html),
in National Laboratory of Bio-Macro-Molecules (http://english.ibp.cas.cn/rh/rd/rdnlb/),
Institute of Biophysics, Chinese Academy of Science

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- Education
  - 2013~ being a parttime EE Ph.D student
  - 2006~2008, Master for computer application and science, State key laboratory of cognitive neuroscience and learning, Beijing Normal University, mentored by Prof. Yufeng Zang
  - 1999~2003, Bachelor for automation control, School of Electric Engineering, ZhengZhou University

- Job experience
  - Jun 2013 ~ now, Programmer in Dr. Todd's Neuroimaging group of Radiology department in Northwester University
  - Feb 2013 ~ now, Guest researcher/Contractor in NIH
  - 2010~2012, Assistant researcher in Institute of Biophysics, Chinese Academy of Science
  - 2008~2010, Research assistant in Institute of Biophysics, Chinese Academy of Science
  - 2004~2006, Professional coder/programmer (Made translation aiding client softwares functioning like trados, made U.S. demographic data predication software online as profamy.com etc.)
  - 2003~2004, Automation engineer in Shougang company (one control center for steel heating stove, designed and supervised by me; many automatical control units revised by me)

Publications & Awards

- **Xiaowei Song**, Zhang-Ye Dong, Xiang-Yu Long, Su-Fang Li, Xi-Nian Zuo, Chao-Zhe Zhu, Yong He, Chao-Gan Yan, Yu-Feng Zang. (2011) REST: A Toolkit for Resting-State Functional Magnetic Resonance Imaging Data Processing. PLoS ONE 6(9): e25031. doi:10.1371/journal.pone.0025031
  (Currently got **1070** citations according to Google scholar, http://scholar.google.com/citations?user=b2M-4scAAAAJ&hl=en)

- Cao, M., Wang, J.-H., Dai, Z.-J., Cao, X.-Y., Jiang, L.-L., Fan, F.-M., **Song, X.-W**., Xia, M.-R., Shu, N., Dong, Q., Milham, M.P., Castellanos, F.X., Zuo, X.-N., He, Y., 2014. Topological organization of the human brain functional connectome across the lifespan. Developmental Cognitive Neuroscience 7, 76–93.

- **Xiaowei Song**, Xue Wang, Kate Alpert, Lejian Huang, Yufen Chen, Lei Wang, Todd Parrish. Rapid automatic comprehensive quality assurance metrics evaluation for Neuroimaging studies. (Accepted in OHBM 2014)

- **Xiaowei Song**, H. P. JEDEMA, H. LU, S.-G. KIM, P. WANG, Y. YANG, *C. W. BRADBERRY, E. A. STEIN;. Longitudinal changes in resting state functional connectivity by cocaine in rhesus monkeys. (Accepted in SfN 2014)

- One year ahead of normal 3-year graduate program, graduated from State key laboratory of cognitive neuroscience and learning of Beijing Normal University in 2008

- Undergraduate awards
  - First-class shcolarship in 2000, ZhengZhou University
  - Tri-good students award in 2001, ZhengZhou University

- Top 5%, when graduated in 2003, within 120 same major students from ZhengZhou University

Research Experience

- 2012~now
  - Monkey fMRI data analysis with ICA and network based methods (such as centrality) (in NIH)
  - Robust pipeline for resting-state fMRI data, target is for stroke patient's resting-state fMRI data pipeline, currently working for normal subjects (in Northwestern University)
  - Independent component analysis (ICA) methods (in UMBC)
- 2008~2012
  - cryo-electrical tomography (cryoET) data processing and related algorithms development including high performance/throughput computing (HPC) in clusters or in distributed computers, enhanced reference-free alignment method, classification convergence test etc..
  - Resolved the HIV Env (gp120) unbound structure and complexed with antibodies (2g12, loop2, CD4, CD4 with 447D, CD4 with 4E10Fab etc.) structure in molecular scale, by reaching 20 angstroms.
  - Resolved cypovirus up to 3.8 angstrom in non-transcribing state by MPSA (multi-path simulated annealing) and AUTO3DEM.
  - Made a pipeline for fully automatic cryoET data pre-processing and reconstruction by HPC (high-performance clusters).
- 2010-8-11/12, In charge of electron tomography practice (Group II B), International Workshop of 3D Molecular Imaging by Cryo-Electron Microscopy (Third K. H. Kuo Summer School of Electron Microscopy and Crystallography)

- 2006~2008
  - Resting-state fMRI data processing and related tools development
  - Resting-state fMRI data analysis toolkit (REST $^{®}$2008SR05547, restfmri.net) coding and maintaining
  - Creator and administrator of http://restfmri.net

Involved research projects

- Parameter optimization and calculation method study in resting-state fMRI. NSFC fund led by [Dr. Yufeng Zang](#).
- High resolution cryoET structure analysis of HIV Env. Led by [Dr. Ping Zhu](#)
  - 100 Talents Program of the Chinese Academy of Sciences.
  - 973 projects involving cryoEM computations.
- IRP fMRI related projects in [Prof. Yihong Yang](#)'s lab in NIH.
- NIH Neuroimaging P50 project in [Prof. Todd's lab](#) in Northwestern University

Computation and coding capabilities

- Master in Data structure and common algorithms in computation, good math background support.
- Master with linux programming in C, Bash, Python, Perl, Javascript, awk, sed etc. Building softwares for science research.
- Master in Delphi(Pascal)/C#/MS Visual C++ in Windows programing
- Master in MySQL/MS SQL database managing and programming
- Master in MATLAB data processing and coding, coded a popular GUI framework from raw (not GUIDE) and HPC supported modularized software REST (restfmri.net)
- Master PBS/TORQUE/Slurm based/like high performance computing
- Master Condor based high throughput computing with clusters or distributed desktop computers
- Knows how to do GPU or MPI based CPU accelerating/parallel computation

Over 200K lines of codes written

Designed and Coded projects

- Classical Runge-Kutta programs to solve ordinary differential equations. (2002, as a class project of automatical system control. Using turbo C, I am the only one who wrote a set of matrix operations function).
- Rail/truck engine monitor system. (2005, using C++ Builder, I wrote a set of COM serial port communication functions and focus on translation of signals and fault tolerance. The set of functions' library were appreciated by many delphibbs's users.)
- Translation assistant, plus huge files transfering program.
    - 2006, in Transn/xWatt http://www.transn.com/, using Delphi, I forged the function of Trados translation system to make an easy-to-use translation assistant, including writing a set of MS Word Macro functions to help translator improve the efficency greatly.
    - And using POP3 and SMTP, I also wrote a huge file auto transfering program (auto split/merge) to ease 1GB Word files comminicatoin between translators by 163 email. Which became one of main tools translator like and use a lot. At that time of Beijing, it is almost no way to trasfer that big files with a single program easily.
- EnCerebra 1 & 2. 2005~2006, part-time project (by Delphi and sqlite), using remote hook like Lingoes/Kingsoft CiBa to automatically record the words user querying, got 3rd prize of 1st Kingsoft software competition.
- REST (resting-state fMRI toolkit). (2006~2007, I built a GUI framework mimicing the MS Windows' GUI message system in MATLAB platform. I also built a set of basic frameworks for neuroimaging data processing, such as automatically calculating big 3D data in restricted memory, using time to exchange the space strategy. Modular framework/levels can be seen in http://restfmri.net/pub/rest_20090422/doc/graph_rev.html. I also created the web based forum using Drupal, http://restfmri.net, plus writing 2 plugins specially for easing literature citation in comment.) The framework is still in use now and stimulated a lot more Neuroimaging softwares (like DPARSF...).
- EEG data processing. 2008, I wrote a set of filtering program (FIR) and drew the EEG brain mapping by using earth/sea interpolation algorithm. Which cleared physicans' doubt about the EEG hardware's problem, got a lot of appreciation from the manufacturer.
- Profamy. (http://www.profamy.com, U.S. household and consumption statistical data migration to web online. 2007, I translated the Fortran codes and resulted data into MS SQL, plus using MS C++.net, worked out the online website. Which start the internet business of human data predication.)
- Co-building IBP (institute of Biophysics, Chinese Academy of Science) HPC system, including designing, biding, installation, debugging.
- Automatic 3D cryoEM (cryo-electrical microscope) data reconstruction. 2008~2012, I designed and coded the automatic 3D tomography system using HPC by mixed C/Python/Bash/awk/Perl/MATLAB scripts. For the key parts like removing bad pictures, using statistical detection method to judge, improved the final 3D image quality and make the whole system very efficient. The researcher can get the 3D result very easily and very soon. Not like traditional days' tedious work.
- Fully automated web-based QA system for MPRAGE/fMRI EPI/DTI/ASL/Phantom using HPC as backend, normal users can check data quality with iPad, using mixed C/Python/Bash/awk/Perl/MATLAB scripts as server part, XNAT as web front end. Which is now a favorite Neuroimaging tool of NU.
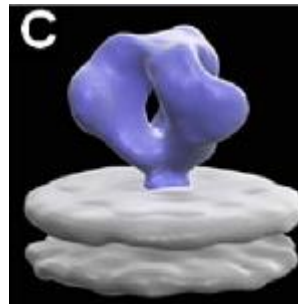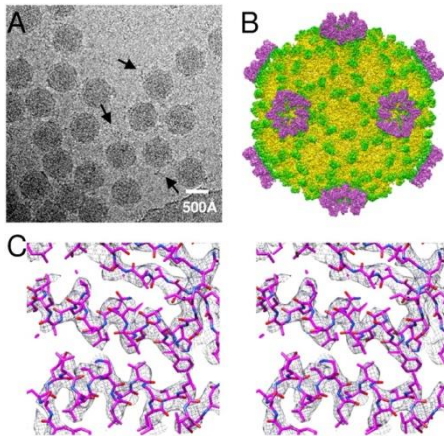
NeuroImaging related skills

- EEG related data processing
- Resting-state fMRI data processing (ReHo, ALFF, functional connectivity etc. computation)
- Basic data statistics such as T-test, ANOVA, etc.
- ICA/Network centrality/GLM in the human functional connectome analysis
- Anatomical normalization/segmentation for human and monkey brain
- My contributions for REST (sample codes: http://restfmri.net/pub/rest_20090422/doc/rest_20090422/fc.html)
  - Coded 1.0 and 1.1 for about 15K lines
  - Implemented a framework of REST
  - Implemented, maintaining and administrating the website of restfmri.net
  - SliceViewer as a MATLAB version of MRIcro
- Also the 3rd author of xjView

(http://www.alivelearn.net/xjview/about/)
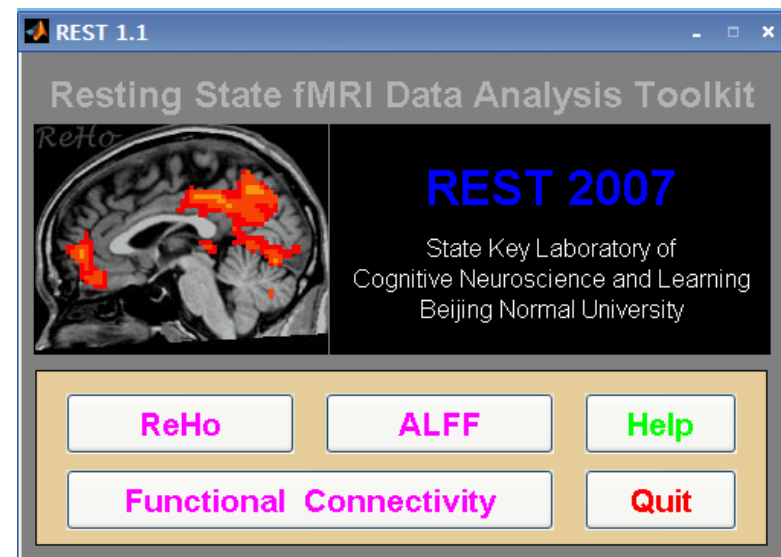
cryoEM/cryoET related skills

- Based on in-house codes and Protomo/IMOD to do cryoET, made an automatical high-throughput 3D tomography program, running under HPC (high-performance computing clusters), in accordance with high-throughput Titan Krios electrical microscope
- 3D Sub-tomogram averaging in Fourier space and PCA based classification
- Isotropic/Anisotropic filtering and NLM (non-local means) filtering
- Resolved cypovirus up to 3.8 angstrom by MPSA and AUTO3DEM