Haotian Teng

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RESEARCH EXPERIENCE

Masters Research Project, Using Machine learning algorithm in Nanopore Basecalling 2017.2 – Present
Advisor: Prof. Lachlan Coin, Institute for Molecular Bioscience, University of Queensland

- Built a deep learning-based basecaller Chiron using Tensorflow, for Oxford Nanopore sequencer basecalling (Program page: https://github.com/haotianteng/Chiron)
- Prepared training dataset of DNA and RNA Nanopore basecalling reads, using Nanoraw and graphmap to label the data.
- Implemented a pipeline in Google Cloud and Google Compute engine for end-to-end genome analysis.

Internship and Winter Scholar, The development of spontaneous neural activity in the zebrafish 2016.3 –2017.2
Advisor: Prof. Geoffrey Goodhill, Queensland Brain Institute, University of Queensland

- Built a pipeline for laboratory automation and data analysis in Zebrafish neuron experiment with Aduino, LabVIEW and MATLAB.
- Constructed PHANTOM toolbox for projecting visual stimulation with conformal transformation, used for zebrafish tectum research. Program page in Github: https://github.com/haotianteng/PHANTOM-toolbox
- Developed algorithms for functional connectivity reconstruction using regularization method under scale free assumption, correct the false positive correlation due to common input, transition connection and latent common input.

Internship, Feedback in AIY neurons in Thermotaxis behavior of C.elegans 2015.7-2015.12
Advisor: Prof.Aravinthan D.T. Samuel, Center for Brain Science, Harvard University, Boston

- Studied thermotaxis in C.elegans with tracking and multi-neuron fluorescent marked.
- Cross & keep the worm, experiment using a spinning disk confocal microscope and the afterwards data acquisition & processing with combination of ImageJ (Miji) and Matlab
- Proved the derivation dependence between AFD neuron and temperature, designed and conducted the experiment to measure the parameters of the AFD-temperature relationship with temperature signal input under different shape.

Research Assistant, Locomotion and PH sensoring mechanism in C.elegans & fast reaction traking System development 2012.7-2015.6

Advisor: Dr. Louis Tao, Center for Bioinformatics, Peking University, Beijing

- Marked GCaMP6 into the C.elegans ASH, AWC, ASE neurons to testify and determine the neuron responsible for PH sensoring.
- Developed a neuro-muscle model of C.elegans motor system and proved the theoretical prediction of gait adaptation in C.elegans.
- Recorded and analyzed long-term locomotion parameter of C.elegans by using a tracking and photographing system.
- Developed a visualization tool with openGL to describe and simplify the neuron network in C.elegans, and enabled the tool to search the whole neural pathway through any two given neurons.
- Built a tracking system as one of the contributors, which could achieve high-precision (accuracy below 1 micron) tracking and photographing and simultaneous data collection & processing
- Modified and developed a “snake” model based algorithm for robust and precise C.elegans center line extraction.

Internship, Micro-fluid chip preparation for C.elegans PH sensoring experiment 2014.3-2014.10

Advisor: Prof. Huang Yanyi, Biodynamics Optical Imaging Center, Peking University

- Designed, fabricated and tested a micro-fluid chip for fast generating stable linear gradient field.
- Designed, fabricated and tested a micro-fluid chip to achieve temporal change separately in 6 rooms, realizing record the temporal responses of C.elegans 6 worms at the same time
- Developed a Computational Fluid Dynamics (CFD) module for the micro fluid chips fluid field calculation in Fluent, which could draw the flow field from the CAD design sketch.

PUBLICATIONS

- **H.Teng**, M. Cao, M.B. Hall, T. Duarte, S. Wang, L. Coin. “Chiron: Translating nanopore raw signal directly into nucleotide sequence using deep learning.” submitted to *GigaScience (under review)*
- L. Avitan, Z. Pujic, J. Mölter, M. Van De Poll, B. Sun, **H. Teng**, R. Amor, E.K. Scott and G.J. Goodhill. “Spontaneous Activity in the Zebrafish Tectum Reorganizes over Development and Is Influenced by Visual Experience.” *Current Biology, 27(16), pp.2407-2419. 2017.*
- **H. Teng**. “A neuron-muscle circuit model of C.elegans’s locomotion.” *Bachelor of Science Thesis: Peking University, 2015*

EDUCATION

University of Queensland, Queensland, Australia
M.S., Bioinformatics 2016 – Present (expected Dec. 2017)

- Advisor: Prof. Lichlan Coin, Institute of Molecular Bioscience, University of Queensland

- Advisor: Prof. Geoffrey Goodhill, Queensland Brain Institute, University of Queensland

Peking University, Beijing, China
B.S., Physics 2011 – 2015

HONORS AND AWARDS

- The 1st Prize at 27th Chinese Physics Olympiad, Zhejiang Province (rank 1/1232 in theory part) 2011
- The Silver Medal at 27th Chinese Physics Olympiad, Finals 2011
- The 1st Prize at 29th Parts of the National College Students Physics Competition 2012

ACTIVITIES

Workshop in Concepts in Bioinformatics, University of Queensland, Queensland Feb 2016 –July 2012

- Led a team of 5 members in python programming for sequence analysis and phylogenetic analysis.
- Constructed phylogenetic tree and determined the protein family based on UPGMA, reconstructed ancestral protein sequences based on ASR methods and evolutional models.
- Given a new protein weighting matrix constructed based on DNA codons and a modified Sankoff algorithm of ASR.

Final project contest in Methods of Mathematical Physics, Beijing Oct 2012 – Jan 2013

- Led a team of 5 members to do numerical simulation and theoretical analysis of energy level in hydrogen atom.
- Calculated the asymptotic behavior of radial equation (confluent hypergeometric equation) and verified it with the numerical simulation.
- Derived the analytical solutiuon of the confluent hypergeometric which truncated by certain quantum number
- Studied the ionization state, calculated asymptotic behavior and the phase shifting analytic expression.

SKILLS

- Programming: Python, C, C++, Matlab, R, Linux, LaTeX,
- Packages&Platforms: Tensorflow, MXNet, Caffe, CUDA, cuDNN, OpenGL, BWA, SAMtools, Velvet, DIAMOND, BLAST+, Minimap2, H5py, Psychtoolbox, LabVIEW, Arduino.
- Software: PyMOL, Fluent(ANSYS), Origin, AutoCAD, Primer Premier, DNA Man, Microsoft Office,
- Wet-lab experiment skill: Molecular cloning, Microinjection
- Language: Chinese(Mother Language), English(Fluent), Spanish(basic), German (Pizza-orderable)
  TOEFL: Cumulative 103 (R 29, L 29, S 23, W 22); GRE: V 150, Q 169, AW 3.0
- Proficient in Piano playing, accomplished the Piano highest-grade (grade 10) in 2005, learned since 6 years old. Skillful in saxophone.