

Shann-Ching Chen, Ph.D.

151 El Camino Real #117, Millbrae, CA 94030 • (412) 519-3783 • shannchingchen@gmail.com

SUMMARY OF EXPERIENCE

A dedicated, versatile biomedical data scientist with extensive academic and industrial experiences in biomedical image analysis, cancer genomics and translational research. Specializing in data integration, genome interpretation and precision medicine. Strong publication records in high profile journals including *Nature*, *Cell*, *Science* and *New England Journal of Medicine*. Excellent in verbal and written communication skills.

SIGNIFICANT EXPERIENCE

Senior Scientist

Compal Electronics, Inc.

August 2017 ~ present

- Identify various key biomedical applications and leverage the state-of-the-art artificial intelligence algorithms for computer-aided diagnosis and precision medicine.

Kaggle Data Science Bowl 2017 Participant Total Prize: 1M USD February 2017 ~ May 2017

- Goal: Develop machine learning algorithms to detect malignant nodules in Lung 3D-CT Scans.
- Team Automated Cancer Evaluation (ACE) result: Ranked 121 among 1972 teams (top 7%)

Senior Oncology Bioinformatician

Natera, San Carlos (Supervisor: C. Jimmy Lin)

December 2016 ~ January 2017

- Examined the genomic landscapes of major human cancers to prioritize cell free DNA sequencing.

Scientific Program Director, Institute for Computational Health Sciences

University of California, San Francisco (Supervisor: Atul Butte)

October 2015 ~ July 2016

- Identified gender and ethnicity of human cancer cell lines for precision medicine.
- Drafted Oncology Models Forum - a crowdsourcing platform for cancer researchers to deposit, share and validate current models that can be best translated into human clinical medicine.

Bioinformatics Staff Scientist, Ion Torrent Commercial Applications

Life Technologies/Thermo Fisher Scientific

July 2013 ~ October 2015

- Led bioinformatics development for Ion AmpliSeq™ Pharmacogenomics Research Panel, including genotyping and copy number assay and analytic solution in a single workflow.
- Performed standardized and customized data analyses to support a wide variety of NGS-based applications, including oncology, CFTR, genotyping by sequencing, and gene fusion identification.

Bioinformatics Associate Research Scientist, Department of Pathology

St. Jude Children's Research Hospital (Supervisor: Charles G. Mullighan)

June 2009 ~ July 2013

- Collaborated with pediatric oncologists to enhance understanding of cancer biology through in-depth computational analysis of genomic datasets obtained from patient samples and mouse models.
- Applied known methods and developed novel algorithms for genomic data analysis, including gene expression, epigenetic and SNP chips, and next-generation sequencing data.

Postdoctoral Research Associate, Laboratory for Computational Cell Biology

The Scripps Research Institute (Advisor: Gaudenz Danuser)

October 2007 ~ June 2009

- Developed image analysis software to map complicated cell migration patterns into a spatiotemporal space, called morphodynamic profiles, where protrusion and retraction events can be quantitatively characterized.

Graduate Research Assistant, Center for Bioimage Informatics

Carnegie Mellon University (Advisor: Robert F. Murphy)

January 2004 ~ September 2007

- Designed machine learning methodologies to provide an objective, quantitative and repeatable assignment of protein locations in fluorescence microscopy images.

- Programmed major utilities on the Protein Subcellular Localization Image Database, one of the most important repositories for microscopy images documenting the subcellular location of proteins.

Graduate Research Assistant, Advanced Multimedia Processing Lab

Carnegie Mellon University (Advisor: Tsuhan Chen)

August 2001 ~ December 2002

- Devised efficient computational methods to retrieve similar global structures and local active sites in the protein structure database.

SPECIALIZED SKILLS

Programming Skills

- R, Python, Matlab, C, C++, SQL, Java, Perl, Linux, 80X86 Assembly

Image Analysis

- Pattern Recognition of Protein Subcellular Localization in Microscopy Images
- Quantification of Cell Migration in Live Cell Images

Probabilistic Graphical Models

- Novel Approximate Inference Algorithms for Image Segmentation and Classification
- Gaussian Mixture Model for Copy Number Inference

PATENTS & HONORS

- Rapid Amplification of Nucleic Acids, U.S. Application No. 62/245,809 2016 (pending)
- Tip-Free Pad for Paper Cups, Patent No. 146940, Taiwan 1999 ~ 2009
- Outstanding Engineering Student Prize, Chinese Institute of Engineers 1999
- Book Coupon Award, National Taiwan University 1995, 1996
- Mayor's Award, Taipei Municipal Chien Kuo Senior High School 1995

EDUCATION & TRAINING

The Scripps Research Institute, La Jolla, CA October 2007 ~ June 2009

Postdoctoral Research Associate in Department of Cell Biology

Carnegie Mellon University, Pittsburgh, PA January 2004 ~ September 2007

Ph.D. in Biomedical Engineering, with a dissertation entitled "Graphical Model Approaches to Segmentation and Classification for Analysis of Protein Subcellular Location Patterns"

Carnegie Mellon University, Pittsburgh, PA August 2001 ~ December 2002

M.S. in Electrical and Computer Engineering

National Taiwan University, Taipei, Taiwan September 1995 ~ June 1999

B.S. in Computer Science and Information Engineering

PUBLICATIONS

Journal Papers

1. Bhattacharya S., Li J., Sockell A., Kan M.J., Bava F.A., Chen S.-C., Ávila-Arcos M.C., Ji X., Smith E., Asadi N.B., Lachman R.S., Lam H.Y.K., Bustamante C.D., Butte A.J., Nolan G.P. "Whole-genome sequencing of Atacama skeleton shows novel mutations linked with dysplasia". *Genome Res.* 2018;28(4):423-431.
2. Stoddart A., Nakitandwe J., **Chen S.-C.**, Downing J.R., Le Beau M.M. "Haploinsufficient loss of multiple 5q genes may fine-tune Wnt signaling in del(5q) therapy-related myeloid neoplasms". *Blood.* 2015;126(26):2899-901.
3. Churchman M.L., Low J., Qu C., Paietta E.M., Kasper L.H., Chang Y., Payne-Turner D., Althoff M.J., Song G., **Chen S.-C.**, Ma J., Rusch M., McGoldrick D., Edmonson M., Gupta P., Wang Y.D.,

- Caufield W., Freeman B., Li L., Panetta J.C., Baker S., Yang Y.L., Roberts K.G., McCastlain K., Iacobucci I., Peters J.L., Centonze V.E., Notta F., Dobson S.M., Zandi S., Dick J.E., Janke L., Peng J., Kodali K., Pagala V., Min J., Mayasundari A., Williams R.T., Willman C.L., Rowe J., Luger S., Dickins R.A., Guy R.K., Chen T., Mullighan C.G. "Efficacy of Retinoids in IKZF1-Mutated BCR-ABL1 Acute Lymphoblastic Leukemia". *Cancer Cell* 28(3):343-56 2015
4. Wong J.C., Weinfurter K.M., Alzamora Mdel P., Kogan S.C., Burgess M.R., Zhang Y., Nakitandwe J., Ma J., Cheng J., **Chen S.-C.**, Ho T.T., Flach J., Reynaud D., Passequé E., Downing J.R., Shannon K. "Functional evidence implicating chromosome 7q22 haploinsufficiency in myelodysplastic syndrome pathogenesis". *eLife* 2015;10.7554/ eLife.07839
 5. Tu H.C., Schwitalla S., Qian Z., LaPier G.S., Yermalovich A., Ku Y.C., **Chen S.-C.**, Viswanathan S.R., Zhu H., Nishihara R., Inamura K., Kim S.A., Morikawa T., Mima K., Sukawa Y., Yang J., Meredith G., Fuchs C.S., Ogino S., Daley G.Q. "LIN28 cooperates with WNT signaling to drive invasive intestinal and colorectal adenocarcinoma in mice and humans". *Genes Dev.* 29(10):1074-86 2015
 6. de Bruin E.C., McGranahan N., Mitter R., Salm M., Wedge D.C., Yates L., Jamal-Hanjani M., Shafi S., Murugaesu N., Rowan A.J., Grönroos E., Muhammad M.A., Horswell S., Gerlinger M., Varela I., Jones D., Marshall J., Voet T., Van Loo P., Rasmussen D.M., Rintoul R.C., Janes S.M., Lee S.M., Forster M., Ahmad T., Lawrence D., Falzon M., Capitanio A., Harkins T.T., Lee C.C., Tom W., Teefe E., **Chen S.-C.**, Begum S., Rabinowitz A., Phillimore B., Spencer-Dene B., Stamp G., Szallasi Z., Matthews N., Stewart A., Campbell P., Swanton C. "Spatial and temporal diversity in genomic instability processes defines lung cancer evolution". *Science* 346(6206):251-6 2014
 7. Roberts K.G., Li Y., Payne-Turner D., Harvey R.C., Yang Y.L., Pei D., McCastlain K., Ding L., Lu C., Song G., Ma J., Becksfort J., Rusch M., **Chen S.-C.**, Easton J., Cheng J., Boggs K., Santiago-Morales N., Iacobucci I., Fulton R.S., Wen J., Valentine M., Cheng C., Paugh S.W., Devidas M., Chen I.M., Reshmi S., Smith A., Hedlund E., Gupta P., Nagahawatte P., Wu G., Chen X., Yergeau D., Vadodaria B., Mulder H., Winick N.J., Larsen E.C., Carroll W.L., Heerema N.A., Carroll A.J., Grayson G., Tasian S.K., Moore A.S., Keller F., Frei-Jones M., Whitlock J.A., Raetz E.A., White D.L., Hughes T.P., Guidry Auvil J.M., Smith M.A., Marcucci G., Bloomfield C.D., Mrózek K., Kohlschmidt J., Stock W., Kornblau S.M., Konopleva M., Paietta E., Pui C.H., Jeha S., Relling M.V., Evans W.E., Gerhard D.S., Gastier-Foster J.M., Mardis E., Wilson R.K., Loh M.L., Downing J.R., Hunger S.P., Willman C.L., Zhang J., Mullighan C.G. "Targetable kinase-activating lesions in Ph-like acute lymphoblastic leukemia". *N Engl J Med.* 371(11):1005-15 2014
 8. Dail M., Wong J., Lawrence J., O'Connor D., Nakitandwe J., **Chen S.-C.**, Xu J., Lee L.B., Akagi K., Li Q., Aster J.C., Pear W.S., Downing J.R., Sampath D., Shannon K. "Loss of oncogenic Notch1 with resistance to a PI3K inhibitor in T-cell leukaemia". *Nature* 513(7519):512-6 2014
 9. Cai D., **Chen S.-C.***, Prasad M.*, He L., Wang X., Choesmel-Cadamuro V., Sawyer J.K., Danuser G. and Montell D. "Mechanical feedback through E-cadherin promotes direction sensing during collective cell migration". *Cell* 157(5):1146-59 2014 (*equal contribution)
 10. Treanor L.M., Zhou S., Janke L., Churchman M.L., Ma Z., Lu T., **Chen S.-C.**, Mullighan C.G., Sorrentino B.P. "Interleukin 7 receptor mutants initiate early T-cell precursor leukemia in murine thymocyte progenitors with multipotent potential ". *J Exp Med* 211(4):701-13 2014
 11. Young D.J., Stoddart A., Nakitandwe J., **Chen S.-C.**, Qian Z., Downing J.R., Le Beau M.M. "Knockdown of Hnrnpa0, a del(5q) gene, alters myeloid cell fate in murine cells through regulation of AU-rich transcripts". *Haematologica* 99(6):1032-40 2014
 12. Li Q., Bohin N., Wen T., Ng V., Magee J., **Chen S.-C.**, Shannon K., Morrison S.J. "Oncogenic Nras has bimodal effects on stem cells that sustainably increase competitiveness". *Nature* 504(7478):143-7 2013
 13. Shah S., Schrader K.A., Waanders E., Timms A.E., Vijai J., Miething C., Wechsler J., Yang J., Hayes J., Klein R.J., Zhang J., Wei L., Wu G., Rusch M., Nagahawatte P., Ma J., **Chen S.-C.**, Song G., Cheng J., Meyers P., Bhojwani D., Jhanwar S., Maslak P., Fleisher M., Littman J., Offit L., Rau-Murthy R., Fleischut M.H., Corines M., Murali R., Gao X., Manschreck C., Kitzing T., Murty

- V.V., Raimondi S.C., Kuiper R.P., Simons A., Schiffman J.D., Onel K., Plon S.E., Wheeler D.A., Ritter D., Ziegler D.S., Tucker K., Sutton R., Chenevix-Trench G., Li J., Huntsman D.G., Hansford S., Senz J., Walsh T., Lee M., Hahn C.N., Roberts K.G., King M.C., Lo S.M., Levine R.L., Viale A., Socci N.D., Nathanson K.L., Scott H.S., Daly M., Lipkin S.M., Lowe S.W., Downing J.R., Altshuler D., Sandlund J.T., Horwitz M.S., Mullighan C.G., Offit K. "A recurrent germline PAX5 mutation confers susceptibility to pre-B cell acute lymphoblastic leukemia". *Nat Genet.* 45(10):1226-31 2013
14. Wu V.C., Wu C.K., Chang Y.C., Young G.H., **Chen S.-C.**, Yang W.S., Chen C.Y., Wang W.J., Lin C.Y., Lin Y.H., Lin S.L., Chueh S.C., Wu K.D.; TAIPAI study group. "Association of the variations in the HSD3 β gene with primary aldosteronism". *J Hypertens.* 31(7):1396-405 2013
 15. Figueroa M.E.* , **Chen S.-C.***, Andersson A.K., Phillips L.A., Li Y., Sotzen J., Kundu M., Downing J. R., Melnick A. M., Mullighan C.G. "Integrated Genetic and Epigenetic Analysis of Childhood Acute Lymphoblastic Leukemia". *J Clin Invest.* 123(7):3099-111 2013 (*equal contribution)
 16. Xu J., Haigis K.M., Firestone A.J., McNERNEY M.E., Li Q., Davis E., **Chen S.-C.**, Nakitandwe J., Downing J.R., Jacks T., Le Beau M.M., Shannon K. "Dominant role of oncogene dosage and absence of tumor suppressor activity in Nras-driven hematopoietic transformation" *Cancer Discov.* 3(9):993-1001 2013
 17. Shieh A., Ward A.F., Donlan K.L., Harding-Theobald E., Mullighan C.G., Zhang C., **Chen S.-C.**, Su X., Downing J.R., Bollag G.E., Shannon K. "Defective K-Ras Oncoproteins Overcome Impaired Effector Activation to Initiate Leukemia In Vivo". *Blood* 121(24):4884-93 2013
 18. Holmfeldt L., Wei L., Diaz-Flores E., Walsh M., Zhang J., Ding L., Payne-Turner D., Churchman M., Andersson A., **Chen S.-C.**, McCastlain K., Becksfort J., Ma J., Wu G., Patel S.N., Heatley S.L., Phillips L.A., Song G., Easton J., Parker M., Chen X., Rusch M., Boggs K., Vadodaria B., Hedlund E., Drenberg C., Baker S., Pei D., Cheng C., Huether R., Lu C., Fulton R.S., Fulton L.L., Tabib Y., Dooling D.J., Ochoa K., Minden M., Lewis I.D., To L.B., Marlton P., Roberts A.W., Raca G., Stock W., Neale G., Drexler H.G., Dickins R.A., Ellison D.W., Shurtleff S.A., Pui C.H., Ribeiro R.C., Devidas M., Carroll A.J., Heerema N.A., Wood B., Borowitz M.J., Gastier-Foster J.M., Raimondi S.C., Mardis E.R., Wilson R.K., Downing J.R., Hunger S.P., Loh M.L., Mullighan C.G. "The genomic landscape of hypodiploid acute lymphoblastic leukemia". *Nat Genet.* 45(3):242-52 2013
 19. Yu S., Zhou X., Steinke F.C., Liu C., **Chen S.-C.**, Zagorodna O., Jing X., Yokota Y., Meyerholz D.K., Mullighan C.G., Knudson C.M., Zhao D.-M., Xue H.-H. "The TCF-1 and LEF-1 Transcription Factors Have Cooperative and Opposing Roles in T Cell Development and Malignancy". *Immunity* 37(5):813-826 2012
 20. Gruber T.A., Gedman A.L., Zhang J., Koss C.S., Marada S., Ta H.Q., **Chen S.-C.**, Su X., Ogden S.K., Dang J., Wu G., Gupta V., Andersson A.K., Pounds S., Shi L., Easton J., Barbato M.I., Mulder H.L., Manne J., Wang J., Rusch M., Ranade S., Ganti R., Parker M., Ma J., Radtke I., Ding L., Cazzaniga G., Biondi A., Kornblau S.M., Ravandi F., Kantarjian H., Nimer S.D., Doehner K., Doehner H., Ley T.J., Ballerini P., Shurtleff S., Tomizawa D., Adachi S., Hayashi Y., Tawa A., Shih L.-Y., Liang D.-C., Rubnitz J., Pui C.-H., Mardis E.R., Wilson R.K., Downing J.R. "An Inv(16)(p13.3q24.3)-Encoded CBFA2T3-GLIS2 Fusion Protein Defines an Aggressive Subtype of Pediatric Acute Megakaryoblastic Leukemia". *Cancer Cell* 22(5):683-697 2012
 21. Roberts K.G., Morin R.D., Zhang J., Hirst M., Zhao Y., Su X., **Chen S.-C.**, Payne-Turner D., Churchman M.L., Harvey R.C., Chen X., Kasap C., Yan C., Becksfort J., Finney R.P., Teachey D.T., Maude S.L., Tse K., Moore R., Jones S., Mungall K., Birol I., Edmonson M.N., Hu Y., Buetow K.E., Chen I.-M., Carroll W.L., Wei L., Ma J., Kleppe M., Levine R.L., Garcia-Manero G., Larsen E., Shah N.P., Devidas M., Reaman G., Smith M., Paugh S.W., Evans W.E., Grupp S.A., Jeha S., Pui C.-H., Gerhard D.S., Downing J.R., Willman C.L., Loh M.L., Hunger S.P., Marra M., Mullighan C.G. "Genetic Alterations Activating Kinases and Cytokine Receptor Signaling in High-Risk Acute Lymphoblastic Leukemia". *Cancer Cell* 22(2):153-66 2012
 22. Lu C.P., Polak L., Rocha A.S., Pasolli H.A., **Chen S.-C.**, Sharma N., Blanpain C., Fuchs E. "Identification of stem cell populations in sweat glands and ducts reveals roles in homeostasis and

- wound repair". *Cell* 150(1):136-50 2012
23. Zhang J., Ding L., Holmfeldt L., Wu G., Heatley S.L., Payne-Turner D., Easton J., Chen X., Wang J., Rusch M., Lu C., **Chen S.-C.**, Wei L., Collins-Underwood J.R., Ma J., Roberts K.G., Pounds S.B., Ulyanov A., Becksfort J., Gupta P., Huether R., Kriwacki R.W., Parker M., McGoldrick D.J., Zhao D., Alford D., Espy S., Bobba K.C., Song G., Pei D., Cheng C., Roberts S., Barbato M.I., Campana D., Coustan-Smith E., Shurtleff S.A., Raimondi S.C., Kleppe M., Cools J., Shimano K.A., Hermiston M.L., Doulatov S., Eppert K., Laurenti E., Notta F., Dick J.E., Basso G., Hunger S.P., Loh M.L., Devidas M., Wood B., Winter S., Dunsmore K.P., Fulton R.S., Fulton L.L., Hong X., Harris C.C., Dooling D.J., Ochoa K., Johnson K.J., Obenauer J.C., Evans W.E., Pui C.H., Naeve C.W., Ley T.J., Mardis E.R., Wilson R.K., Downing J.R., Mullighan C.G. "The genetic basis of early T-cell precursor acute lymphoblastic leukaemia". *Nature* 481(7380):157-63 2012
 24. Gutierrez A., Kentsis A., Sanda T., Holmfeldt L., **Chen S.-C.**, Zhang J., Protopopov A., Chin L., Dahlberg S.E., Neuberg D.S., Silverman L.B., Winter S.S., Hunger S.P., Sallan S.E., Zha S., Alt F.W., Downing J.R., Mullighan C.G., Look A.T. "The BCL11B tumor suppressor is mutated across the major molecular subtypes of T-cell acute lymphoblastic leukemia". *Blood* 118(15):4169-73 2011
 25. **Chen S.-C.**, Gordon G.J., and Murphy R.F. "Graphical Models for Structured Classification, with an Application to Interpreting Images of Protein Subcellular Location Patterns". *Journal of Machine Learning Research* 9, 651-682 2008
 26. **Chen S.-C.**, Zhao T., Gordon G.J., and Murphy R.F. "Automated Image Analysis of Protein Localization in Budding Yeast". *Bioinformatics* 23:i66-i71 2007
 27. **Chen S.-C.** and Murphy R.F. "A graphical model approach to automated classification of protein subcellular location patterns in multi-cell images". *BMC Bioinformatics* 7:90 2006
 28. Yang L.-W., Rader A.J., Liu X., Jursa C.J., **Chen S.-C.**, Karimi H., and Bahar I. "oGNM: A protein dynamics online calculation engine using the Gaussian Network Model". *Nucleic Acids Research* 34, W24-31 2006
 29. **Chen S.-C.**, and Bahar I. Mining frequent patterns in proteins: "A study of serine proteinases". *Bioinformatics* 20, i77-i85 2004

Peer-Reviewed Conference Proceedings

1. **Chen S.-C.** and Danuser G. "Quantitative Analysis of Border Cell Migration". Signals, Systems and Computers, 55-60 2008
2. **Chen S.-C.**, Zhao T., Gordon G.J., and Murphy R.F. "A Novel Graphical Model Approach to Segmenting Cell Images". *Proceedings of the 2006 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology*, 1079-1086 2006
3. **Chen S.-C.**, Gordon G.J., and Murphy R.F. "A Novel Approximation Inference Approach to Automated Classification of Protein Subcellular Location Pattern in Multi-cell Image". *Proceedings of the 2006 IEEE International Symposium on Biomedical Imaging*, 558-561 2006
4. **Chen S.-C.**, and Chen T. "Retrieval of 3D Protein Structure". *Proceedings of the 2002 International Conference on Image Processing*, 933-936 2002
5. **Chen S.-C.**, and Chen T. "Protein Retrieval by Matching 3D Surfaces". *Proceedings of the 2002 Workshop on Genomic Signal Processing and Statistics*, CP2-09: 1-4 2002

Book Chapter

- Zhao T., **Chen S.-C.**, and Murphy R.F. "Location Proteomics". In: Introduction to Systems Biology. (S. Choi, ed.) 2006

EXTRACURRICULAR ACTIVITIES

- President of Student Council, Department of Computer Science and Information Engineering
National Taiwan University June 1997 ~ May 1998
- Vice-President of Creative Intelligent Club
National Taiwan University September 1996 ~ June 1997