Shuyue Guan

Email: frankshuyueguan@gwu.edu
Website: shuyueg.github.io
Google Scholar: F0ABc9cAAAAJ
ORCID: 0000-0002-3779-9368

EDUCATION

The George Washing University (GWU)   Washington, DC USA
Ph.D. in Biomedical Engineering, Advisor: Murray H. Loew   2017–Current
M.S. in Computer Science, Advisor: Claire Monteleoni   2015–2017

Northeast Forestry University (NEFU)   Harbin, China
M.S. in Biophysics, Advisor: Dawei Qi   2010–2013
B.S. in Physics   2006–2010

RESEARCH OVERVIEW

Research Interests: Machine Learning, Deep Learning, Image Processing, Computer Vision

Transparent Deep Learning   2018–Current
 − Learnability of deep learning models
 − Generalizability of deep neural networks
 − Data separability measure
 − Generative Adversarial Networks (GANs) performance evaluation

Deep Learning Applications on Medical Images   2017–Current
 − Deep learning models for medical images segmentation
 − GANs for cancer detection
 − Transfer learning for cancer detection

Hyperspectral Images-based Cardiac Ablation Lesion Detection   2016–2018
 − Optimization of wavelength selection for multispectral image acquisition
 − Unsupervised learning for lesions detection on hyperspectral images

Climate (Frost Point) Data Collection and Analysis   2016
Department of Computer Science at GWU, Advisor: Claire Monteleoni

Scene Image Identification and Positioning   2014
Advisor: Dongjie Zhu at Harbin Institute of Technology

Non-destructive Testing for Wooden Materials   2010–2013
 − Defects description in blockboard
 − Multifractal analysis for the defects recognition
 − Automatic fiberboard density testing based on CT

The Design and Production of Chinese Medicine Ultrasonic Extraction Machine   2009–2010
Adviser: Runzhou Su at NEFU

 − Participated in the undergraduate innovative experimental project of NEFU

Publications

[1] A. Lou, **S. Guan**, and M. H. Loew, "DC-UNet: rethinking the U-Net architecture with dual channel efficient CNN for medical image segmentation", in *Medical Imaging 2021: Image Processing*, International Society for Optics and Photonics, vol. 11596, SPIE, 2021, pp. 749–759. DOI: 10.1117/12.2582338.

[2] **S. Guan** and M. Loew, "An internal cluster validity index using a distance-based separability measure", in *2020 IEEE 32nd International Conference on Tools with Artificial Intelligence (ICTAI)*, 2020, pp. 827–834. DOI: 10.1109/ICTAI50040.2020.00131.

[3] **S. Guan** and M. Loew, "Evaluation of generative adversarial network performance based on direct analysis of generated images", in *2019 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, 2019, pp. 1–5. DOI: 10.1109/AIPR47015.2019.9174595.

[4] **S. Guan** and M. Loew, "Breast cancer detection using synthetic mammograms from generative adversarial networks in convolutional neural networks", *Journal of medical imaging*, vol. 6, no. 3, pp. 031 411–031 411, Jul. 2019, ISSN: 2329-4302. DOI: 10.1117/1.JMI.6.3.031411.

[5] **S. Guan** and M. Loew, "Using generative adversarial networks and transfer learning for breast cancer detection by convolutional neural networks", in *Medical Imaging 2019: Imaging Informatics for Healthcare, Research, and Applications*, International Society for Optics and Photonics, vol. 10954, SPIE, 2019, pp. 306–318. DOI: 10.1117/12.2512671.

[6] H. Asfour, **S. Guan**, N. Muselimyan, L. Swift, M. Loew, and N. Sarvazyan, "Optimization of wavelength selection for multispectral image acquisition: A case study of atrial ablation lesions", *Biomed. Opt. Express*, vol. 9, no. 5, pp. 2189–2204, May 2018. DOI: 10.1364/BOE.9.002189.

[7] **S. Guan**, N. Kamona, and M. Loew, "Segmentation of thermal breast images using convolutional and deconvolutional neural networks", in *2018 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, 2018, pp. 1–7. DOI: 10.1109/AIPR.2018.8707379.

[8] **S. Guan**, H. Asfour, N. Sarvazyan, and M. Loew, "Application of unsupervised learning to hyperspectral imaging of cardiac ablation lesions", *Journal of medical imaging*, vol. 5, no. 4, pp. 046 003–046 003, Oct. 2018, ISSN: 2329-4302. DOI: 10.1117/1.JMI.5.4.046003.

[9] **S. Guan** and M. Loew, "Breast cancer detection using transfer learning in convolutional neural networks", in *2017 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, 2017, pp. 1–8. DOI: 10.1109/AIPR.2017.8457948.

[10] H. Mu, M. Zhang, D. Qi, **S. Guan**, and H. Ni, "Wood Defects Recognition Based on Fuzzy BP Neural Network", *International Journal of Smart Home*, vol. 9, pp. 143–152, 5 2015.

[11] **S. Guan** and D. Qi, "Defect edge detection in blockboard x-ray images by shannon entropy", *International Journal on Advances in Information Sciences and Service Sciences*, vol. 5, pp. 988–996, 2013.

[12] **S. Guan** and D. Qi, "Defects description in blockboard by hough transform and minimum-perimeter polygons", *International Journal of Advancements in Computing Technology*, vol. 4, no. 23, pp. 365–375, 2012. DOI: 10.4156/ijact.vol4.issue23.43.

[13] **S. Guan** and D. Qi, "Multifractal analysis of blockboard x-ray images for the defect detection", *Advances in Information Sciences and Service Sciences*, vol. 4, no. 18, pp. 149–156, 2012. DOI: 10.4156/AISS.vol4.issue18.18.

[14] **S. Guan**, D. Qi, and Y. Han, "Automatic fiberboard density testing based on application of computed tomography", in *Information and Business Intelligence*, Springer Berlin Heidelberg, 2012, pp. 614–620, ISBN: 978-3-642-29084-8.

[15]   Y. Han, D. Qi, and **S. Guan**, "Application of computed tomography in wood-polymer composites density detection", in *Materials Science and Engineering Technology (ISMSET)*, ser. Advanced Materials Research, vol. 428, Trans Tech Publications Ltd, Feb. 2012, pp. 57–60. DOI: 10.4028/www.scientific.net/AMR.428.57.

Manuscripts

[1]   **S. Guan**, M. Loew, "Analysis of Generalizability of Deep Neural Networks Based on the Complexity of Decision Boundary", *[In press] International Conference on Machine Learning and Applications (ICMLA)*, 2020, arXiv: 2009.07974

[2]   **S. Guan**, M. Loew, "Understanding the Ability of Deep Neural Networks to Count Connected Components in Images", *[In press] IEEE Applied Imagery Pattern Recognition (AIPR)*, 2020, arXiv: 2101.01386

[3]   **S. Guan**, M. Loew, "The estimation of training accuracy for two-layer neural networks on random datasets without training", *[arXiv Preprint]*, arXiv: 2010.13380

[4]   **S. Guan**, M. Loew, H. Ko, "Data Separability for Neural Network Classifiers and the Development of a Separability Index", *[arXiv Preprint]*, arXiv: 2005.13120

[5]   **S. Guan**, M. Loew, "A Novel Measure to Evaluate Generative Adversarial Networks Based on Direct Analysis of Generated Images", *[arXiv Preprint]*, arXiv: 2002.12345

Academic Service

- **Journal Reviewer:**   IEEE TPAMI, IEEE TNNLS, IEEE TEVC, IEEE TMI, IEEE TBD, IEEE Access, PR, ACM TKDD, Computational Intelligence, JAIHC, SPIE JMI, IJMI
- **Conference Reviewer:**   AISTATS (2021), WACV (2021)

Awards and Honors

Collins Distinguished Doctoral Award	2020
Honorable Mention Poster Award, SPIE Medical Imaging Conference	2019
Gail E. Boggs Graduate Engineering Endowment Scholarship	2019
Tyler Wean Scholarship	2019
125th Anniversary Endowment Scholarship	2019
Timothy Tong Endowment Fellowship	2019
Harriet Green Tischler Endowment Scholarship	2019
Provincial Excellent Graduate, Heilongjiang China	2013
Excellent Graduate, NEFU	2013
National Graduate Fellowship, China	2012
Graduate Technology Innovation Project Fund, NEFU	2010
Excellent Undergraduate Thesis, NEFU	2010
Successful Participant, Mathematical Contest in Modeling	2010

Teaching Assistant

- Biomedical Engineering Capstone Project Lab   Spring 2021, Spring 2018
  BME 4925W, BME 3915W (all courses are in GWU)
- Computer Vision   Fall 2020, Spring 2018
  BME/ECE 6885
- Biomedical Engineering MATLAB Programming   Spring 2020, Fall 2019, Spring 2019
  BME 2820
- Biomedical Engineering C Programming   Fall 2019
  BME 2825
- Pattern Recognition   Fall 2018, Fall 2017
  BME/ECE 6850
- Digital Image Processing   Spring 2017
  BME/ECE 6840
- Design and Analysis of Algorithms   Fall 2016
  CSCI 6212
- Probability for Computer Science   Spring 2016
  CSCI 3362/6362

Volunteer

- IEEE Applied Imagery Pattern Recognition (AIPR) Workshop   2019, 2018, 2017, 2016
- IEEE International Symposium on Biomedical Imaging (ISBI) Conference   2018
- AIESEC   Winter 2013, Winter 2012
  "Green Power Now!"
- AIESEC   Summer 2013, Summer 2012
  "Dear to Dream"