

Chulwoo Pack

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<https://github.com/chulwoopack>

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EDUCATION

UNIVERSITY OF NEBRASKA-LINCOLN **Lincoln, NE**
Ph.D. in Computer Science **MAY 2023**

- GPA: 3.85/4.00
- Advisor: Professor Leen-Kiat Soh
- Dissertation: Enhancing Document Layout Analysis on Historical Newspapers: Visual Representation, Pseudo-ground-truth, and Downscaling
- Area of Study: Image Segmentation, Image Processing, Machine Learning, Deep Learning

SOUTH DAKOTA STATE UNIVERSITY **Brookings, SD**
Master of Science in computer science **MAY 2017**

- GPA: 3.86/4.00
- Advisor: Professor Sung Shin
- Thesis: Optimizing Multilayer Perceptron with Dynamic Learning Rate to Classify Breast Microwave Tomography
- Area of Study: Image Classification, Image Processing, Machine Learning, Artificial Neural Network

Bachelor of Science in Computer Science **MAY 2015**

- GPA: 3.75/4.00 **Magna Cum Laude*
- Advisor: Professor Sung Shin

UNIVERSITY OF ULSAN **Ulsan, Korea**
Bachelor of Engineering in computer engineering **AUGUST 2017**

- GPA: 4.19/4.50
- Dual Degree with South Dakota State University

RESEARCH INTERESTS

- Document Image Analysis (Document Image Quality Assessment, Document Image Segmentation), Machine Learning (Deep Learning), Computer Vision (Object Recognition, Semantic Segmentation)

RESEARCH EXPERIENCE

CENTER FOR BRAIN, BIOLOGY, AND BEHAVIOR (CB3), UNIVERSITY OF NEBRASKA-LINCOLN **Lincoln, NE**
Graduate Research Assistant & Programmer **Sep. 2021-May 2023**

- Developed a repository for the athletic concussion data.
- Delivered lecture/hands-on sessions for graduate students to apply a Convolutional Neural Network to EEG/ERP data for the classification of schizotypy status.
- Developed Python scripts to automate the process of generating a number of statistics from various psychology experiments, such as N-back, face-matching, and BELT tasks.

CYBER-SECURITY EDUCATION, UNIVERSITY OF NEBRASKA-LINCOLN **Lincoln, NE**
Graduate Research Assistant **Jan. 2021-Aug. 2021**

- Developed an intelligent tutoring system capable of tutoring students in a personalized fashion by tracking their feedback history.

DIGITAL STRATEGY DIVISION, LIBRARY OF CONGRESS **Washington D.C.**
Research Scientist/Engineer Intern **Jul. 2019-Jan. 2020**

GitHub link: <https://github.com/LibraryOfCongress/Exploring-ML-with-Project-Aida>

- Worked with staff onsite at the Library of Congress for 6 weeks to generate enriched metadata from cultural heritage digitized materials through computational image analysis tools and various deep learning models.
- Proposed and demonstrated various use-cases of applying various machine learning techniques, such as page segmentation and document type classification, on cultural heritage digitized materials.

IMAGE ANALYSIS FOR ARCHIVAL DISCOVERY (AIDA), UNIVERSITY OF NEBRASKA-LINCOLN **Lincoln, NE**
Graduate Research Assistant **Dec. 2017-Dec. 2020**

GitHub link: <https://github.com/ProjectAida/aida>

- Developed deep learning models using multimodality and augmentation to segment digitized historical newspaper images from the Chronicling America repository, maintained by the U.S. Library of Congress.
- Developed a method to cluster digitized historical document images using latent features of a deep learning model to better understand a large-scale digital collection.

CONVERGENT COMPUTING TECHNOLOGY LABORATORY, SOUTH DAKOTA STATE UNIVERSITY

Brookings, SD

Graduate Research Assistant

Jan. 2015-Mar. 2016

- Developed a Computer-Aided Diagnosis system using C# and MATLAB with Electronics and Telecommunications Research Institute (ETRI), in Korea.
- Developed an algorithm to boost the performance of the artificial neural network for the brain MTI classification task.

CONVERGENT COMPUTING TECHNOLOGY LABORATORY, SOUTH DAKOTA STATE UNIVERSITY

Brookings, SD

Graduate Research Assistant

May. 2013-Dec. 2014

- Assisted a Ph.D. student in reviewing several extraction & machine learning algorithms such as edge detection and Support Vector Machine.
- Maintained the Lab server.

ADDITIONAL EXPERIENCE

CSCE 428/828 AUTOMATA, COMPUTATION AND FORMAL LANGUAGES, UNIVERSITY OF NEBRASKA-LINCOLN

Lincoln, NE

Teaching Assistant

Sep. 2017-Dec. 2017

- Tutored students to help them better understand course materials.
- Graded assignments, quizzes, and exams.

OFFICE OF INFORMATION & TECHNOLOGY, SOUTH DAKOTA STATE UNIVERSITY

Brookings, SD

Web Developer

May. 2013-May. 2017

- Administrated South Dakota State University website by writing and testing the business software products.
- Troubleshoot tickets to resolve technical issues.

SKILLS

Fundamental

- C, C++, C#, Java, Python, GIT

Research

- MATLAB, OpenCV, Tensorflow, Keras, PyTorch

Web-development

- ASP.NET, AJAX, PHP, JavaScript, SQL

PUBLICATIONS

Chulwoo Pack, Leen-Kiat Soh, Elizabeth Lorang. "Adaptive Image Downscaling for Semantic Segmentation on Large Document Images." *International Journal on Document Analysis and Recognition*. (Forthcoming, Spring 2023).

Rui Zhao, Harvey Siy, **Chulwoo Pack**, Leen-Kiat Soh, Myoungkyu Song. "[An Intelligent Tutoring System for API Misuse Correction by Instant Quality Feedback](#)." In *Proceedings of the 45th Annual Computers, Software, and Applications Conference (COMPSAC)*. pp. 123-128. IEEE. 2022.

Chulwoo Pack, Leen-Kiat Soh, Elizabeth Lorang. "[Visual domain knowledge-based multimodal zoning for textual region localization in noisy historical document images](#)." *Journal of Electronic Imaging*. 30(6). 2021.

Chulwoo Pack, Yi Liu, Leen-Kiat Soh, Elizabeth Lorang. "[Augmentation-based Pseudo-Groundtruth Generation for Deep Learning in Historical Document Segmentation for Greater Levels of Archival Description and Access](#)." *Journal of Computing and Cultural Heritage (JOCCH)*. 2021.

Elizabeth Lorang, Leen-Kiat Soh, Yi Liu, and **Chulwoo Pack**. "[Digital Libraries, Intelligent Data Analytics, and Augmented Description: A Demonstrated Project](#)." Submitted to the *Library of Congress*. 2020.

Elizabeth Lorang, Leen-Kiat Soh, **Chulwoo Pack**, and Yi Liu. "[Application of the Image Analysis for Archival Discovery Team's First-Generation Methods and Software to the Burney Collection of British Newspapers](#)." *CDRH Grant Reports*. 7. 2019.

Chulwoo Pack, Seong-Ho Son, and Sung Shin. "[Computer aided diagnosis with boosted learning for anomaly detection in microwave tomography](#)." *ACM SIGAPP Applied Computing Review*. 17(3). pp. 39-47. 2017.

Chulwoo Pack, Sung Shin, Hyung-Do Choi, Soon-Ik Jeon, and John Kim. "[Optimized multilayer perceptron using dynamic learning rate-based microwave tomography breast cancer screening](#)." In *Proceedings of the 31st Annual ACM Symposium on Applied Computing*. pp. 2171-2175. ACM. 2016.

Chulwoo Pack, Sung Shin, Seong-Ho Son, and Soon-Ik Jeon. “[Computer aided breast cancer diagnosis system with fuzzy multiple-parameter support vector machine.](#)” In *Proceedings of the 2015 conference on research in adaptive and convergent systems*. pp. 172-176. ACM. 2015.

Chulwoo Pack, Samaneh Aminikhanghahi, Sung Shin, Soon-Ik Jeon, and Seong-Ho Son. “[An optimized fuzzy support vector machine classifier using breast mammogram tomography: Trade-off between specificity and sensitivity.](#)” *International Information Institute*. 18(9). pp. 3979-3988. 18. 2015.

Sallies Gc, **Chulwoo Pack**, Sung Shin, and Hyung-Do Choi. “[Breast cancer classification of mammography masses using improved shape features.](#)” In *Proceedings of the 2015 Conference on research in adaptive and convergent systems*, pp. 188-194. ACM. 2015

Samaneh Aminikhanghahi, Sung Shin, Wei Wang, Soon-Ik Jeon, Seong-Ho Son, and **Chulwoo Pack**. “[Study of wireless mammogram image transmission impacts on robust cyber-aided diagnosis systems.](#)” In *Proceedings of the 30th Annual ACM Symposium on Applied Computing*, pp. 2252-2256. ACM. 2015.

PRESENTATIONS

- Research Presenter. Library of Congress, Washington, DC, January 2020
- Research Presenter. National Digital Newspaper Program Awardee Conference, Washington, DC, September 2018
- Regular Paper Presenter. ACM Symposium on Applied Computing (SAC). Pisa, Italy, April 2016
- Poster Presenter. Sanford Health — SDSU Biomedical Research Symposium, Sioux Falls, SD, November 2015
- Regular Paper Presenter. ACM Research in Applied Computation Symposium (RACS). Prague, Czech Republic, October 2015
- Regular Paper Presenter. ACM Symposium on Applied Computing (SAC). Salamanca, Spain, April 2015
- Regular Paper Presenter. ACM Research in Applied Computation Symposium (RACS). Towson, MD, October 2014

PROFESSIONAL SERVICES

- Reviewer for International Journal on Document Analysis and Recognition (IJДАР) '23
- Reviewer for IEEE Transactions on Geoscience and Remote Sensing (TGRS) '22
- Reviewer for Public Library of Science (PLOS) '21
- Reviewer for Journal of Experimental & Theoretical Artificial Intelligence '16
- Judge for Jackrabbit BEST Robotics '15
- Assistant staff for Programming Design Competition (PDC '14, '15, '16)

HONORS AND AWARDS

- SAC Student Travel Award, April 2016
- Dean's List, Spring 2013, Fall 2014
- Oversea Study Scholarship from the UOU Foundation, 2011
- TOEIC Scholarship from the UOU Foundation, 2011
- Great Enrollment Scholarship from the Hyundai Heavy Industries, 2011-2014

PROFESSIONAL REFERENCES

- Leen-Kiat Soh, Professor at the School of Computing at the University of Nebraska-Lincoln, (lksoh@cse.unl.edu)
- Elizabeth Lorang, Associate Professor of Libraries at the University of Nebraska-Lincoln, (llorang2@unl.edu)
- Sung Shin, Professor of Electrical Engineering/Computer Science at the South Dakota State University, (sung.shin@sdstate.edu)
- Wei Wang, Associate Professor of Computer Science at the San Diego State University, (wwang@mail.sdsu.edu)
- Wendy Craddock, Assistant Vice President for Information Technology at the South Dakota State University, (wendy.craddock@sdstate.edu)
- Hoon Oh, Professor of Computer Engineering at the University of Ulsan, (hoonoh@ulsan.ac.kr)