CAN LI

Carnegie Mellon University ⋄ Pittsburgh, PA

⋄ canl1@andrew.cmu.edu

EDUCATION

Carnegie Mellon University   *August 2016-May 2021*

Ph.D. in Chemical Engineering

- Cumulative GPA: 3.93/4.00
- Research advisor: Prof. Ignacio E. Grossmann
- Stochastic Mixed-integer Programming and Applications to Energy Systems

Tsinghua University   *August 2012-July 2016*

B.Eng. in Chemical Engineering

- Overall GPA: 91/100, Rank: 3/71
- Research advisor: Prof. Yushan Zhu, Prof. Chu Wang
- Thesis: Sequence-Based Prediction of Cysteine Reactivity Using Machine Learning

University of Wisconsin, Madison   *August 2014-December 2014*

Exchange Student, Department of Chemical and Biological Engineering

- Overall GPA: 3.96/4.00

RESEARCH EXPERIENCE

Carnegie Mellon University   *November 2016-present*

Research Assistant   *Advisor: Prof. Ignacio E. Grossmann*

- Decision-making under uncertainty: several new algorithms and software packages for solving stochastic mixed-integer nonlinear programming problems that are intractable by commercial solvers
- Energy systems: power systems infrastructure planning with high renewables penetration, shale gas development planning under uncertainty in natural gas price that leads to millions of dollar savings
- Data-driven methods: a deep reinforcement learning approach for chemical production scheduling

Peking University   *October 2015-July 2016*

Independent Researcher   *Advisor: Prof. Chu Wang*

- Gathered mass spectrometry data reflecting functional cysteine reactivity in proteomes.
- Developed a novel sequence-based feature-selection tool and a machine learning-based algorithm, sbPCR, for cysteine reactivity prediction

University of Washington, Seattle   *July 2015-September 2015*

Student Intern   *Advisor: Prof. David Baker*

- Computational protein design: used in-house software for *de novo* design of protein fibers
- Experimental work: expressed desired designs in *E.coli* and characterized them using experimental methods, such as Transmission Electron Microscopy (TEM) and mass spectrometry.

University of Wisconsin, Madison   *August 2014-December 2014*

Independent Researcher   *Advisor: Prof. Christos T. Maravelias*

- Chemical production scheduling: built three new continuous-time models for scheduling multistage batch process under utility constraints

WORK EXPERIENCE

Argonne National Laboratory, Lemont, IL
Givens Associate at Mathematics and Computer Science Division
           May 2020-August 2020
           Supervisor: Dr. Kibaek Kim

· Developed decision-rule based algorithms for stochastic mixed-integer programs
· Applied the developed approach to an energy storage problem that considers uncertainty in renewable power generation

ExxonMobil Upstream Research Company, Spring, TX
Research intern in Decision Support and Optimization team
          May 2018-August 2018
          Supervisor: Dr. Kevin Furman

· Designed an infeasibility detector for LNG ship scheduling problem and implemented in C++
· Designed a library of test cases for the infeasibility detector to enable the deployment of a scheduling software for operators

TEACHING EXPERIENCE

CMU, Department of Chemical Engineering   *January 2017-present*
Teaching Assistant

- Designed and gave guest lectures, held office hours, designed and graded assignments and projects, instructed and supervised students in project work, lead student group discussions
- Courses: Chemical Process Systems Design, Process Systems Modeling, Advanced Process Systems Engineering

CMU, Eberly Center for Teaching Excellence & Educational Innovation   *September 2019-present*
Future Faculty Program

- Participated in seminars to improve teaching and communication skills
- Obtained feedback from experts through two teaching observations

RESEARCH MENTORING

Haoyue Liang, Undergraduate student from CMU ChemE   *September 2018-August 2019*
- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Stochastic Mixed-integer Nonlinear Programming Libraries

Hyukjae Kwark, Undergraduate student from CMU ChemE   *September 2018-August 2019*
- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Stochastic Mixed-integer Nonlinear Programming Libraries

Zedong Peng, Visiting PhD student from Zhejiang University   *August 2019-August 2020*
- Jointly supervised with Prof. Ignacio Grossmann in collaboration with SK Innovation
- Project title: Multi-period Design and Planning Model of Shale Gas Field Development

Yue Sha, Visiting PhD student from Tsinghua University   *January 2019-July 2019*
- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Integrated Scheduling and Procurement under Endogenous Uncertainty using Stochastic Programming

Nikhil Eti, Master student from CMU ChemE   *August 2019-June 2020*
- Jointly supervised with Prof. Ignacio Grossmann in collaboration with SK Innovation
- Project title: Multi-period Design and Planning Model of Shale Gas Field Development

Divyam Mandalia, Master student from CMU ChemE   *January 2019- December 2019*

- Jointly supervised with Prof. Ignacio Grossmann in collaboration with Total
- Project title: Integration of reservoir modeling with oilfield planning and infrastructure optimization

PUBLICATION

[1] Li, C., Bernal, D.E., Furman, K.C., Duran, M.A. and Grossmann, I.E., 2020. Sample average approximation for stochastic nonconvex mixed integer nonlinear programming via outer-approximation. Optimization and Engineering, pp.1-29.

[2] Hubbs, C.D., Li, C., Sahinidis, N.V., Grossmann, I.E. and Wassick, J.M., 2020. A Deep Reinforcement Learning Approach for Chemical Production Scheduling. Computers & Chemical Engineering, p.106982.

[3] Li, C., Eason, J.P., Drouven, M.G. and Grossmann, I.E., 2020. Shale gas pad development planning under price uncertainty. AIChE Journal, 66(6), p.e16933.

[4] Li, C. and Grossmann, I.E., 2019. A generalized Benders decomposition-based branch and cut algorithm for two-stage stochastic programs with nonconvex constraints and mixed-binary first and second stage variables. Journal of Global Optimization, 75(2), pp.247-272.

[5] Li, C. and Grossmann, I.E., 2019. A finite ϵ-convergence algorithm for two-stage stochastic convex nonlinear programs with mixed-binary first and second-stage variables. Journal of Global Optimization, 75(4), pp.921-947.

[6] Lara, C.L., Bernal, D.E., Li, C. and Grossmann, I.E., 2019. Global optimization algorithm for multi-period design and planning of centralized and distributed manufacturing networks. Computers & Chemical Engineering, 127, pp.295-310.

[7] Li, C. and Grossmann, I.E., 2018. An improved L-shaped method for two-stage convex 0-1 mixed integer nonlinear stochastic programs. Computers & Chemical Engineering, 112, pp.165-179.

[8] Wang, H.*, Chen, X.*, Li, C.*, Liu, Y., Yang, F. and Wang, C., 2018. Sequence-based prediction of cysteine reactivity using machine learning. Biochemistry, 57(4), pp.451-460.

* = Co-1st-Author

PAPER UNDER REVIEW OR IN PREPARATION

[1] Torres, J.J., Li, C., Apap, R.M. and Grossmann, I.E., A Review on the Performance of Linear and Mixed Integer Two-Stage Stochastic Programming Algorithms and Software. Under review in Computational Optimization and Applications.

[2] Li, C., A.J. Conejo, P. Liu, B.P. Omell, J.D. Siirola, I.E. Grossmann. Mixed-integer Linear Programming Models and Algorithms for Generation and Transmission Expansion Planning of Power Systems. Under review in European Journal of Operations Research.

[3] Li, C., I.E. Grossmann. A Review of Stochastic Programming Methods for Optimization of Process Systems under Uncertainty. Under review in Frontiers in Chemical Engineering.

[4] Brunaud, B., Li, C., Ochoa, M.P., Welch, A., Grossmann, I.E., PlasmoAlgorithms, a collection of decomposition algorithms for graph-based problem representations. In preparation.

CONFERENCE PRESENTATIONS

[1] **Can Li**, Antonio J. Conejo, Benjamin P. Omell, John D. Siirola, Ignacio E. Grossmann (2020) Power Systems Infrastructure Planning with High Renewables Penetration. AIChE Annual Meeting, San Francisco.

[2] **Can Li**, David E. Bernal, Kevin C. Furman, Marco A. Duran, Ignacio E. Grossmann (2020) Sample Average Approximation for Stochastic Nonconvex Mixed Integer Nonlinear Programming via Outer-Approximation. AIChE Annual Meeting, San Francisco.

[3] **Can Li**, David E. Bernal, Kevin C. Furman, Marco A. Duran, Ignacio E. Grossmann (2020) Sample Average Approximation for Stochastic Nonconvex Mixed Integer Nonlinear Programming via Outer-Approximation. INFORMS Annual Meeting.

[4] **Can Li**, Ignacio E. Grossmann (2019). A finite ϵ-convergence algorithm for two-stage stochastic convex nonlinear programs with mixed-binary first and second stage variables. XV ICSP conference, Trondheim.

[5] **Can Li**, Ignacio E. Grossmann (2019). On Solving Nonconvex Two-stage Stochastic Programs With Generalized Benders Decomposition. INFORMS Annual Meeting, Seattle.

[6] **Can Li**, Ignacio E. Grossmann, John P. Eason, Markus G. Drouven (2019). Single Pad Planning Under Uncertainty for Shale Gas Development. AIChE Annual Meeting, Orlando.

[7] **Can Li**, Ignacio E. Grossmann (2018). On Solving Nonconvex Two-stage Stochastic Programs with Generalized Benders Decomposition. AIChE Annual Meeting, Pittsburgh.

[8] **Can Li**, Ignacio E. Grossmann (2018). A finite ϵ-convergence algorithm for two-stage convex 0-1 mixed-integer nonlinear stochastic programs with mixed-integer first and second stage variables. INFORMS Annual Meeting, Phoenix.

[9] **Can Li**, Ignacio E. Grossmann (2018). An Improved L-shaped Method for Two-stage Convex 0-1 Mixed Integer Nonlinear Stochastic Programs. PSE 2018, San Diego.

INVITED SEMINAR

[1] Can Li (2021). Decision-making under uncertainty through mathematical programming: Optimization of sustainable energy systems design and operation. Davidson School of Chemical Engineering, Purdue University.

[2] Can Li (2021). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Los Alamos National Laboratory, invited by Dr. Harsha Nagarajan

[3] Can Li (2018). On Solving Stochastic Mixed-integer Nonlinear Programs. Department of Chemical Engineering, Tsinghua University, invited by Prof. Yushan Zhu

HONORS AND AWARDS

- Honorable mention award, 42nd Annual CHEGSA Symposium, Carnegie Mellon University, 2020
- Best Poster Award, Center for Advanced Process Decision-making (CAPD) annual meeting, 2018
- Jinyong Award, Department of Chemical Engineering, Tsinghua University, 2015
- CSC Scholarship, Exchange Student at UW-Madison, 2014
- Lijieshen Award, Department of Chemical Engineering, Tsinghua University, 2014
- Second Prize, Physics Olympiad for Undergraduates in Beijing, 2014
- Member, Spark Talents Program for Technological Innovation, Tsinghua University, 2014
- Comprehensive Excellent Scholarship (3/116 in Department of Chemical Engineering), Tsinghua University, 2013
- First Prize (1st of Henan Province), National Olympiad in Chemistry, 2011

REVIEW SERVICE

- Optimization and Engineering
- Computers & Chemical Engineering
- Journal of Global Optimization
- Mathematical Programming
- International Journal of Electrical Power and Energy Systems
- Computers and Electrical Engineering
- SN Operations Research Forum

CONFERENCE ORGANIZATION

- Cluster Chair, INFORMS Annual Meeting, 2020
- Session Chair, INFORMS Annual Meeting, 2020
- Session Chair, XV ICSP conference, Trondheim, 2019.