

Changsheng Lu

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Education

- Sep 2017–
Mar 2020 **Shanghai Jiao Tong University**, *Department of Automation*, Shanghai, China.
- M.S. Degree
 - Majored in Pattern Recognition and Intelligent System
- Sep 2013–
Jun 2017 **Southeast University**, *Department of Automation*, Nanjing, China.
- B.S. Degree
 - Outstanding undergraduate of Southeast University

Selected Awards and Honors

- Awards
- 2019 **National Scholarship**, awarded by Ministry of Education of China
 - 2018 Scholarship of 14th Research Institute of China Electronics Technology Corporation
 - 2017 **National Scholarship**, awarded by Ministry of Education of China
 - 2017 **First class award for excellent undergraduate thesis of universities in Jiangsu province** (The only winner of the whole department)
 - 2017 Envision Future Scholarship, awarded by Envision Energy company.
 - 2017 **“Top Ten Presentation”** of the 7th student’s academic presentation of Southeast University
 - 2014 **Principal’s Scholarship** of Southeast University
- Honors
- 2020 **Outstanding Master graduate** in Shanghai
 - 2018 Merit Student of Shanghai Jiao Tong University
 - 2018 Excellent League Member of Shanghai Jiao Tong University
 - 2017 **Outstanding Undergraduate** of Southeast University
 - 2014 Merit Student of Southeast University

- Competition Awards
- 2016 Provincial First Prize of “TI Cup” National Electronic Design Competition
 - 2016 Third prize in National Information Security Competition
 - 2015 Provincial First Prize of National Electronic Design Competition
 - 2015 Second Prize in the “Freescale Cup” Smart Car Competition
 - 2014 Third Prize in China Collegiate Programming Contest
 - 2014 **First Prize in Advanced Mathematics Competition**

Research of Interests

I have wide research interests mainly including computer vision, image processing, transfer learning, pattern recognition, and robotics. Particularly, I am interested in the theories and algorithms that improve robot or intelligent device’s perception, cognition and reasoning ability, which could empower machine to see, think and conduct more like a human.

Publications

For more details, please refer to <https://alanlusun.github.io/publications/>

Journal Papers

- 2020 **Changsheng Lu**, Siyu Xia, Ming Shao, and Yun Fu. Arc-support Line Segments Revisited: An Efficient and High-quality Ellipse Detection. *IEEE Transactions on Image Processing (T-IP)*, vol. 29, pp. 768-781, 2020, doi: 10.1109/TIP.2019.2934352. (**Top Journal, published**)

Changsheng Lu, Chaochen Gu, Kaijie Wu, Siyu Xia, Haotian Wang, Xinping Guan. Deep transfer neural network using hybrid representations of domain discrepancy. *Neurocomputing*, 2020. (**Journal, published**)

Conference Papers

- 2020 Ting Zhu, Siyu Xia, Zhangxing Bian, **Changsheng Lu**. “Highlight Removal in Facial Images.” In *The Third Chinese Conference on Pattern Recognition and Computer Vision (PRCV)*, 2020.

- 2019 Shuxin Zhao, Chaochen Gu, **Changsheng Lu**, Ye Huang, Kaijie Wu and Xinping Guan. “PointDoN: A Shape Pattern Aggregation Module for Deep Learning on Point Cloud.” In *International Joint Conference on Neural Networks (IJCNN 2019)*. (**oral presentation**)

Changjian Gu, **Changsheng Lu**, Chaochen Gu, and Xinping Guan. “Viewpoint Estimation using Triplet Loss with A Novel Viewpoint-based Input Selection Strategy.” In *Journal of Physics: Conference Series*, vol. 1207, no. 1, p. 012009. IOP Publishing, 2019.

- 2018 **Changsheng Lu**, Haotian Wang, Chaochen Gu, Kaijie Wu, and Xinping Guan. “Viewpoint Estimation for Workpieces with Deep Transfer Learning from Cold to Hot.” In *International Conference on Neural Information Processing*, pp. 21-32. Springer, Cham, 2018. (**oral presentation**)
- Mingjian Chen, Hao Zheng, **Changsheng Lu**, Enmei Tu, Jie Yang, and Nikola Kasabov. “A Spatio-Temporal Fully Convolutional Network for Breast Lesion Segmentation in DCE-MRI.” In *International Conference on Neural Information Processing*, pp. 358-368. Springer, Cham, 2018.
- 2017 **Changsheng Lu**, Siyu Xia, Wanming Huang, Ming Shao, and Yun Fu. “Circle Detection by Arc-support Line Segments.” In *2017 IEEE International Conference on Image Processing (ICIP)*, pp. 76-80. IEEE, 2017. (**oral presentation**)

Scientific Achievements

○ Circle Detection Algorithm

1) In order to handle traditional circle detection algorithm’s insufficient robustness, unsatisfactory running speed and hard-applying to industrial vision systems, we propose a precise, robust, fast and industry-oriented circle detection algorithm which could obtain better performance against traditional methods in F-measure/localization accuracy/speed indexes after conducting extensive experiments. The proposed method has already been applied in Nanjing Joint Stars Technology CO., LTD, a wheel manufacturer in Guanzhou, and an object fingerprint extracting and matching project in a laboratory of Shanghai Jiao Tong University. The paper entitled “**Circle Detection By Arc-support Line Segments**” is published on **24th IEEE International Conference on Image Processing (oral presentation)**.

2) The patent “circle detection method, device and electronic equipment” has already been published (CN20171057281.2).

○ High-quality Ellipse Detection Algorithm

1) Based on the proposed concept of “arc-support line segment”, we fully utilize the edge continuity and convexity, fast non-iterative ellipse fitting and five-dimensional hierarchical clustering method to develop a novel ellipse detector which outperforms the current state-of-the-art methods. The main contribution of the proposed ellipse detector is to both accurately and efficiently detect ellipses in images, which is universally considered as a tough and long-standing problem in ellipse detection field. This work has been open source in GitHub [[link](#)] and the corresponding paper “**Arc-support Line Segments Revisited: An Efficient High-quality Ellipse Detection**” is published in **IEEE Transactions on Image Processing (T-IP, IF: 6.79)** which is the top journal in image processing field.

2) The patent “an ellipse detection method based on arc-support line segments” has been issued (CN201710390288.1).

○ Viewpoint Estimation & Deep Transfer Learning

The theoretical knowledge of neural network, deep learning, and transfer learning is meticulously studied. The prior knowledge of CAD model in the virtual environment is transferred to the real scene by using transfer learning, so as to estimate the viewpoint of the real workpiece. In this research, a new training strategy called cold-to-hot training for deep transfer network is proposed, namely training the network with cold start and then switching to the hot phase. The paper entitled “**Viewpoint Estimation for Workpieces with Deep Transfer Learning from Cold to Hot**” is published in **2018 International Conference on Neural Information Processing (oral presentation)**. Moreover, we also merge two current mainstreams of deep transfer learning methods and propose a generic method called hybrid domain adaptation, which could incorporate the advantages of current methods and exhibit stronger transfer ability across various transfer tasks. The corresponding paper “**Deep transfer neural network using hybrid representations of domain discrepancy**” is published in **Neurocomputing (IF: 4.072)**.

○ Other Aspects

I also have proceeded research in the topics including lesion segmentation in MRI images of breast cancer, 3D point cloud data processing, generic vision algorithms (such as object classification, detection, segmentation).

Academic Activity

- Academic Talk
- 2019.07.14–2019.07.19 | Attending the **International Joint Conference on Neural Networks (IJCNN 2019)** which is held in **Budapest, Hungary**, and making oral presentation.
 - 2018.12.13–2018.12.16 | Participating the **International Conference on Neural Information Processing (ICONIP 2018)** in **Siem Reap, Cambodia**, and delivering oral presentation.
 - 2018.06.27–2018.06.29 | Attending the **2018 American Control Conference (ACC 2018)** in **Milwaukee, USA**, and delivering oral presentation.
 - 2017.09.18 | Attending **IEEE International Conference on Image Processing (ICIP 2017)** in **Beijing, China**, and delivering oral presentation.

Academic Journal Services

- Served to review the manuscripts including
- IEEE Computational Intelligence Magazine (IEEE CIM)
 - Pattern Recognition
 - Journal of Visual Communication and Image Representation (JVCIR)
 - Journal of Electronic Imaging
 - Neural Processing Letters (NPL)
 - IEEE/CAA Journal of Automatica Sinica

Conference Services

Served to review the manuscripts of AAAI 2019, CVPR 2018 Workshop, ICMLA (2017, 2018), ICONIP 2018.

Projects and Competitions

In terms of projects and competitions, I participated in and completed many projects and competitions as the first finisher and person in charge, and won many awards. Since Automation is a cross-disciplinary subject, I also have strong exposure to software and hardware knowledge and apply theoretical knowledge to practice through the driven force of projects and competitions which could mainly listed as below:

- **Automatic COVID-19 test bands detection algorithm**
- **High-precision steel ball surface defect detection project**
- **Industrial defect inspection/shape recognition project**
- **Freescale smart car competition**
- **Electronic design competition**
- **Computer programming contest**
- **Advanced mathematics competition**
- **Pet transportation system design project**

Professional Experience

May 2020– **Shanghai Jiao Tong University**

- Present
- Research Assistant
 - Studying and developing novel algorithms for COVID-19 test bands detection, high-precision steel ball surface defect detection, and nanometer thin membrane defect detection.

Sep 2017– **Shanghai Jiao Tong University**

- Mar 2020
- Academic M.S. candidate
 - Studying and developing novel algorithms for workpiece viewpoint estimation, breast lesion segmentation, point cloud data processing, and generic vision algorithms including recognition, detection and segmentation, which are the hot research topics in the field of computer vision, transfer learning and deep learning.

Oct 2016– **Joint Stars Technology CO., LTD, Nanjing**

- May 2017
- Research Intern
 - Developing industry-oriented defect inspection algorithms. During this period, I gained lots of skills and knowledge regarding industrial standards and engineering implementation.

2016 **Huawei Nanjing Research Institute**

Summer ○ Engineer Intern

- I was listed in the first term of Huawei F(X) future scientist program member, engaged in embedded communication software programming (C/C++) and achieved the special offer.

Sep 2013– **Southeast University**

Jun 2017 ○ B.S. candidate

- Establishing lots of interesting projects, e.g. Tetrix, TSP (Traveling Salesman Problem), android travel software, and inverted pendulum/wind pendulum control system, and cultivating broad interests from the underlying hardware to up-level algorithms.

Learning, Living, and Teaching

- Learning is a never-ending topic, so I always uphold a pragmatic attitude and strive to travel in the ocean of knowledge, being tireless and full of innovation and pioneering spirit. I am also keen on discussing problems with others, exchanging views and working together.
- In life, I like communicating with others, getting along well with my mates, helping each other and growing up together. In the class, I also enjoy participating in group activities and happy atmospheres.
- In teaching, I served as TA for the courses of “Advanced Academic Writing” and “C/C++ programming” during my graduate study.

Learning is endless and yet the future is still far; Do not fear the future and do not linger in the past; Just going ahead, working hard and believing in yourself.

Computer Skills

Programming Languages C/C++, Python, MATLAB, Java, C#

Libraries OpenCV, Pytorch, MEX

Languages

The languages in fluent communication:

- Chinese
- English (IELTS 6.5)
- Western Fujian Dialect

Hobbies

- Running

- Playing Basketball/Ping-pong
- Reading Books
- Traveling

Personal Website

- <https://alanlusun.github.io/>