

# Michelle Shu

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## EDUCATION

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**Bachelor of Science:** Applied Mathematics & Statistics  
Computer Science  
**Expected: May 2019** Johns Hopkins University, Baltimore, MD  
Cumulative GPA: 3.97/4.00 (1<sup>st</sup> Major GPA: 3.97/4.00, 2<sup>nd</sup> Major GPA: 4.00/4.00)

## WORK EXPERIENCES

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**Tencent Youtu** – *Tencent Holdings Limited, Shenzhen, China*

**June 2017 – August 2017, June 2018 – August 2018**

- Built and improved TensorFlow models on Visual Relation Detection, Visual Questioning and Answering and Image Manipulation tasks based on current papers; the best-performing model outruns the latest VRD model from CVPR 2017 by approximately 10%.
- Redesign and improve language and vision model on referring relationships, a detection-based framework that takes natural language pairs to locate specific objects to improve performance of object detections.
- Attended the conference CVPR 2018 with the project team, presented at poster sessions and helped setting up Tencent booth and its related events.

**Zoog** – *Student Startup at Johns Hopkins University, MD and University of California, Berkeley, CA*

**January 2018 – Present**

- Built backend infrastructure and designed notification, sorting system and concept videos for an early-stage startup that provides solutions to campus-based, short-term storage for university students.
- Researched for methods that utilized deep learning and computer vision to estimate available storage space for users and designed solutions to ensure user transaction security.
- Participated in the JHU Hatchery Pitch Competition and won 1<sup>st</sup> place (out of 12 startup teams).

**Course Assistant for Objected-Oriented Software Programming**

**September 2018 – Present**

*Johns Hopkins University Computer Science Department, MD*

**Teaching Assistant for Center for Talented Youth Online Program**

**May 2016 – August 2016**

*Johns Hopkins University Center for Talented Youth, MD*

## RESEARCH EXPERIENCES

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**Computational Cognition, Vision and Learning** – *Johns Hopkins University Computer Science Department, MD*

**September 2018 – Present**

- Design LSTM-based adversarial tester models that utilize ideas in reinforcement learning to target weaknesses in different object detection frameworks.
- Write machine-learning scripts to run experiments and generate small but effective synthetic datasets from designed models.
- Lead project meetings, present data and design experiments with doctoral researchers.

**John Wierman's Group** – *Johns Hopkins University Applied Mathematics and Statistics Department, MD*

**January 2018 – Present**

- Propose new methods and its relating algorithms to solve for expected values and probabilities related to a novel type of probabilistic counting-out game.
- Developed multiple variations of the original question and discovered a new set of positive integer sequences from the target question. The current aim is to design strategies to prove the general formula for this set of generating sequences.

**Baseball Analytics Group** – *Johns Hopkins Information Security Institute, MD*

**August 2016 – December 2017**

- Work with the Director of Johns Hopkins Information Security Institute to design an information platform that processes data from SQL database to explore winning strategies and make pitch predictions.
- Collaborate with research staff members from Johns Hopkins University to study and develop machine-learning models to be used in baseball projection systems.

- Improved MATLAB scripts and used various algorithms to analyze images of fluorescent intensity of stem cells on micro patterns as they are exposed to external forces.
- Wrote machine-learning scripts that use protein features collected from experiments to predict success rate of stem cell transition.
- Developed and corrected machine learning and other computer vision algorithms to explore quantitative questions in biomechanics of human cells.

## PUBLICATIONS AND CONFERENCES

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### **Asymptotic Behaviors of Probabilistic Counting-out Game on a Line**

T. Ou, **M. Shu**, J. Wierman. Will appear in MAA Undergraduate Poster Session and AMS Special Session at Joint Mathematics Meeting, 2019

Develop strategies to utilize Markov and integer sum properties to prove exact formula for asymptotic expected survival time for a novel type of probabilistic counting-out game.

### **Referring Image Segmentation via Recurrent Refinement Networks**

R. Li, K. Li, Y. Kuo, **M. Shu**, X. Qi, X. Shen, J. Jia. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018

Utilize the feature pyramids inherently existing in convolutional neural networks to capture the semantics at different scales to improve performance of referring semantic segmentation task.

### **Facelet-Bank for Fast Portrait Manipulation**

Y. Chen, H. Lin, **M. Shu**, R. Li, X. Tao, Y. Ye, X. Shen, J. Jia. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018

Design a model to conduct digital face manipulation based on an end-to-end convolutional neural network that supports fast inference, edit-effect control, and quick partial-model update.

### **Probabilistic Counting-out Game on a Line**

**M. Shu**, T. Ou, J. Wierman. Undergraduate Presentation Session presented at Mathematical Association of America MathFest, 2018

Introduce to a novel type of counting-out game. Derive Markov recursions to solve for exact solutions of winning probability and expected survival, prove its general formula, and discover new type of integer sequences based on variations of this game.

## AWARDS

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**Dean's List** (for 6 consecutive semesters) – Johns Hopkins University, MD

**The Naddor Prize Recipient** – Johns Hopkins University Applied Mathematics and Statistics Department, MD

**The MAA Outstanding Presentation Award** – Mathematical Association of America

**1<sup>st</sup> Place at JHU Hatchery Pitch Competition** – TCO Labs, Johns Hopkins University

## TECHNICAL SKILLS

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**Programming Skills:** C, C++, Python, Java, JUnit, R, SQL, Swift, MATLAB, Linux, Pytorch, TensorFlow, Caffe2

**Languages:** English (Bilingual proficiency), Chinese (Bilingual proficiency), Japanese (Elementary proficiency)

## RELEVANT COURSEWORK

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Deep Learning; Machine Learning; Data Mining; Stochastic Process; Statistics; Probability; Algorithms; Psychology; Cognitive Science; Data Structures; Automata; Bioinformatics; Scientific Computing; Optimization; Linear Algebra; Discrete Mathematics; Single Variable & Multivariable Calculus; Java; iOS Development; Objected-Oriented Software Engineering; Photography; Physics