# Ke Ma

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## Education

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| **Stony Brook University** | Stony Brook, NY, US |
| *Ph.D. (Advisor: Prof. Dimitris Samaras)* | Expected 08/2021 |

- Major in Computer Science

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| **South China University of Technology** | Guangzhou, China |
| *Master in Engineering* | 07/2014 |

- Major in Signal and Information Processing, in School of Electronic and Information Engineering

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| **South China University of Technology** | Guangzhou, China |
| *Bachelor in Engineering* | 07/2011 |

- Major in Information Engineering, in School of Electronic and Information Engineering

## Research Interests

- Computer Vision: texture analysis, 3D estimation, image processing, inverse rendering, image-based rendering
- Deep Learning Applications: document unwarping, medical image processing

## Experience

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| **Research Assistant**, Department of Biomedical Informatics, Stony Brook University | Stony Brook, NY, US |
| Mentor: Prof. Joel Saltz, Prof. Greg Zelinsky, and Prof. Dimitris Samaras | 05/2018-current |
| Project: *Collection and analysis of behavior data from pathologists.* | |
| Mentor: Prof. Joel Saltz, Prof. Maria Vakalopoulou, and Prof. Dimitris Samaras | 03/2020-current |
| Project: *Attention-based sampling for efficient medical image processing.* | |
| **Research Intern**, Megvii Inc. | Redmond, WA, US |
| Mentor: Jue Wang | 05/2017-08/2017 |
| Project: *Data-driven document unwarping.* | |
| **Research Intern**, Adobe Systems. | Seattle, WA, US |
| Mentor: Jue Wang | 02/2017-05/2017 |
| Project: *A parametric human body pose and shape model.* | |
| **Research Assistant**, CVLab, Stony Brook University. | Stony Brook, NY, US |
| Mentor: Michael Petrucci, Daniel L. Magnus, and Prof. Dimitris Samaras | 05/2015-05/2017 |
| Project: *Image-based rail surface defect severity assessment.* | |
| **Teaching Assistant**, Computer Science Department. | Stony Brook, NY, US |
| *Data structure, Robotics, Computer vision, Advanced computer vision.* | 02/2020, 08/2014-05/2015 |
| **Research Intern**, Adobe Systems. | Beijing, China |
| Mentor: Jue Wang, Jianchao Yang, and Zhe Lin | 08/2013-02/2014 |
| Project: *Text detection in natural images.* | |

## Projects

**Data-driven Document Unwarping**

- Formulated the problem as a combination of segmentation and regression in a deep neural network, achieving faster and better unwarping performance than conventional model-driven methods.
- Developed an efficient approach to synthesize deformed document images in 2D for training.
- Improved the results by creating a high-quality 3D deformed document dataset Doc3D containing 100,000 images.
- Incorporated real-world document images for weakly supervised training to further boost the performance.

**Collection and analysis of behavior data from pathologists**

- Developed a web-based interface to collect pathologists' pan/zoom trajectories when they operate a digital microscope. Synchronized with gaze data if an eye tracker is available.

- Proposed to use Wasserstein distance and Markov chain to measure the pathologists' attention variability in spatial and temporal domains.

**Attention-based sampling for efficient medical image processing**
- Estimated the spatial location and magnification of informative regions on a thumbnail of a Whole Slide Image.
- Classify the original gigapixel WSI based on few sampled informative patches.
- This approach is orders of magnitude faster than processing all the patches in a WSI while maintaining a comparable accuracy.

**Large-scale pavement assessment**
- Collected 700,000 pavement images from Google Street View based on the pavement assessment record which is publicly available on NYC open data website.
- Applied FV-CNN to extract pavement features and utilized UnderBagging to alleviate data imbalance.

**Image-based rail surface defect severity assessment**
- Segmented rail surface by Structured Random Forests and Generalized Hough Transform.
- Classified the defect level using Texton Forests as the feature extractor and SVM as the classifier.

**Text detection in natural images**
- Implemented two widely used techniques: Stroke Width Transform and Maximally Stable Extremal Regions.
- Proposed to use multi-label graph-cut with label cost to fit the detected character components into text lines and achieved the state-of-the-art result on ICDAR 2011 and 2013 datasets.

**A parametric human body pose and shape model**
- Modified SMPL model to enable flexible control on individual body part.

# Publication

- Jingwei Zhang, **Ke Ma**, John Van Arnam, Rajarsi Gupta, Joel Saltz, Maria Vakalopoulou, and Dimitris Samaras. "*A Joint Spatial and Magnification Based Attention Framework for Large Scale Histopathology Classification.*" In *CVPR Workshops*, 2021.
- Sagnik Das, Hassan Ahmed Sial, **Ke Ma**, Ramon Baldrich, Maria Vanrell, and Dimitris Samaras. "*Intrinsic Decomposition of Document Images In-the-Wild.*" In *BMVC*, 2020.
- Sagnik Das\*, **Ke Ma\***, Zhixin Shu, Dimitris Samaras, and Roy Shilkrot. "*DewarpNet: Single-Image Document Unwarping with Stacked 3D and 2D Regression Networks.*" In *ICCV*, 2019.
- **Ke Ma**, Zhixin Shu, Xue Bai, Jue Wang, and Dimitris Samaras. "*DocUNet: Document Image Unwarping via A Stacked U-Net.*" In *CVPR*, 2018.
- **Ke Ma**, Minh Hoai, and Dimitris Samaras, "*Large-Scale Continual Road Inspection: Visual Infrastructure Assessment in the Wild.*" In *BMVC*, 2017.
- **Ke Ma**, Dimitris Samaras, Michael Petrucci, and Daniel L. Magnus. "*Texture classification for rail surface condition evaluation.*" In *WACV*, 2016.
- Ningling Wang, Wangyu Liu, Jiale Huang, and **Ke Ma**. "*The structure–mechanical relationship of palm vascular tissue.*" Journal of the mechanical behavior of biomedical materials 36 (2014): 1-11.
- **Ke Ma**. *Gesture Based Multimedia Human Computer Interaction System V1.0*. Software Copyright Register Number: 2012SR046966, 2012

# Skills

Programming languages: Matlab, Python, C++, LaTeX, HTML, Javascript
Libraries: Pytorch, Qt, Keras (Tensorflow), Armadillo (Eigen), Bootstrap
Software: Blender, Microsoft Word, Powerpoint, Excel, Adobe Photoshop, Illustrator

# Academic Services

Reviewer: CVPR, ECCV, ICCV, ACCV, BMVC, WACV, CVIU