Yan Zhang

Human oriented and people foremost.

Image Processing · Computer Vision · Pattern Recognition · Machine Learning · Partial Differential Equation · Mechatronics

Education

2005–2009 **Bachelor of Mechanical Engineering and Automation**, *Southwest Jiaotong University*, Chengdu, China, *Grade: 85/100*.
Mechatronics

2009–2010 **M.Sc in Advanced Control and System Engineering**, *School of Electrical and Electronic Engineering, University of Manchester*, UK, *Grade: Distinction (first-class)*.
Dynamic System · Feed-back Control

2011–2015 **Graduate School of Computer Science**, *Saarland University*, Germany, *Grade of Courses: 1.6, PhD candidate*.
Image Processing and Computer Vision · Variational Method · Machine Learning · Optimization

2015–now **Institute of neural information processing**, *Ulm University*, Germany, PhD candidate.
Human behaviour analysis for elder healthcare

Working Experience

Nov. 2011 – May. 2012 **Research Assistant**, *Human-Computer Interaction Group, Department 4, Max-Planck Institute of Informatics*, Saarbrücken.

Nov, 2012 – Feb. 2015 **Researcher**, *Mathematical Image Analysis Group, Computer Science School, Saarland University*, Saarbrücken.

Mar. 2015 – Dec. 2015 **Research Assistant**, *Medical and Biological Informatics, German Cancer Research Center*, Heidelberg.

Dec. 2015 – Now **Research Assistant**, *Institute of neural information processing, Ulm University*, Ulm.

Projects (since 2011)

- **High Level Computer Vision**: (a) Traffic Sign Detection and Categorization using A Kernel-based Learning Algorithm (**Keywords**: Matlab · machine learning)
- **Human-Computer Interaction**: Developing a novel keyboard layout on an Android tablet using computational methods. (**Keywords**: Android)
- **3D Reconstruction**: Object Scanning and Surface Reconstruction using A RGB-D Camera. (**Keywords**: Iterative Closest Point Algorithm · Kinect · Visual C++)
- **Image Restoration**: Noise Removal in 3D CT Images using Anisotropic Diffusion. (**Keywords**: Nonlinear Partial Differential Equation · Industrial CT Image Stack · C)

- **A Higher-Order Variational Coupling Model**: A Higher-order Variational Coupling Model: continuous theories in the Sobolev space, novel finite difference scheme and convexity, applications on image analysis.
- **Image Segmentation**: A Level-Set Method based on a Novel Edge Detector. (**Keywords**: higher-order variational model · Geodesic Active Contour · Optimization · C)
- **Biomedical Engineering**: Tissue Classification for Laparoscopic Image Understanding based on Multispectral Texture Analysis (**Keywords**: local binary pattern · multispectral imagery · support vector machine · Python)
- **Human Behavior Analysis**: Simulation of disorientation and motor functionalities of elderly people in the lab. (**Keywords**: cognitive impairment reproduction · search experiments · multi-model dataset (video, audio, mocap, etc.) · empirical experiments)
- **Human Behavior Analysis**: Disorientation recognition based on video recordings (**Keywords**: multi-scale analysis · person 3D tracking · walking path and motion energy analysis · action consistency represented by Fisher vectors · state-of-the-art performance (better than deep learning))
- **Human Behavior Analysis**: Continuous activity understanding and early recognition (**Keywords**: pose-context pattern · accumulative learning scheme · early recognition without observing the entire video
- **Human Behavior Analysis**: Temporal action segmentation via dynamic clustering (**Keywords**: unsupervised method · online learning · fast response · superior to state-of-the-art method
- **Human Behavior Analysis**: Human motion parsing via hierarchical dynamic clustering (**Keywords**: unsupervised method · online learning · fast response · superior to state-of-the-art method · fainting/falling detection
- **Human Behavior Analysis**: Adaptive resonance network on human tracking (**Keywords**: novel deep learning method · online learning · superior to state-of-the-art method
- **Software Engineering**: Developing new features and debugging in the MITK software (**Keywords**: git · C++ · QT)
- **Software Engineering**: Development of Social Signal Interpretation (SSI), setup recording system in the lab (**Keywords**: git · C++ · OpenCV)

Publications and Reports

- A. Oulasvirta, A. Reichel, W. Li, Y. Zhang, M. Bachynskyi et al. Two-thumb text entry on touchscreen devices. (CHI'13), April 2013.
- M. Bildhauer, M. Fuchs, J. Weickert, Y. Zhang. An Alternative Approach Towards The Higher-Order Denoising of Images. (manuscript of 60 pages for a mathematical journal), 2013-2014
- Yan Zhang, et al. "Tissue classification for laparoscopic image understanding based on multispectral texture analysis." Medical Imaging 2016: Image-Guided Procedures, Robotic Interventions, and Modeling. Vol. 9786. International Society for Optics and Photonics, 2016.
- Yan Zhang et al. "Tissue classification for laparoscopic image understanding based on multispectral texture analysis." Journal of Medical Imaging 4.1 (2017): 015001.
- Velana, Maria, et al. "The SenseEmotion Database: A Multimodal Database for the Development and Systematic Validation of an Automatic Pain-and Emotion-Recognition System." IAPR Workshop on Multimodal Pattern Recognition of Social Signals in Human-Computer Interaction. Springer, Cham, 2016.

- Yan Zhang, et al. "Visual Confusion Recognition in Movement Patterns from Walking Path and Motion Energy." International Conference on Smart Homes and Health Telematics. Springer, Cham, 2017.
- Yan Zhang, Georg Layher, and Heiko Neumann. "Continuous activity understanding based on accumulative pose-context visual patterns." 2017 Seventh International Conference on Image Processing Theory, Tools and Applications (IPTA) . IEEE, 2017.
- Yan Zhang, He Sun, Siyu Tang, Heiko Neumann. "Temporal Human Action Segmentation via Dynamic Clustering." arXiv preprint arXiv:1803.05790 (2018).

Languages

Chinese	**Native**	*simplified Chinese*
English	**Professional**	*scientific writing*
German	**Basic**	*learning in my spare time*

Additional Skills

Programming	C/C++, CUDA, OpenCV, Matlab, Python, Cython, tensorflow, caffe
System	Unix/Linux, Android, IOS
Software	Latex, Git, Eclipse, Cmake, CAD, Pro/E
Others	Charted Financial Analyst Level-1

Interests

Music	guitar, music composition
Sports	table tennis, hiking
Relaxing	meditation

张言

以人为本

德国
乌尔姆
yz-cnsdqz.github.io
yan.zhang@uni-ulm.de

图像处理 · 计算机视觉 · 机器学习 · 偏微分方程 · 机电一体化

学历

2005–2009 工程学士，机械工程学院, 西南交通大学, 中国成都.
- 分数：85/100
- 专业：机械设计制造及其自动化

2009–2010 科学硕士, 曼彻斯特大学, 英国曼彻斯特.
- 分数：distinction
- 专业：先进控制理论和工程

2011–2015 博士研究生, 萨尔大学, 德国萨尔布吕肯.
- 分数：1.6
- 专业：计算机科学，人工智能，图像处理和计算机视觉
- 课题：高阶耦合变分模型：连续函数理论，离散数值算法和图像分析上的应用

2015–现在 博士研究生, 乌尔姆大学, 德国乌尔姆.
- 专业：计算机科学，人工智能，图像处理和计算机视觉
- 课题：用于老年人监护的人体行为分析

工作经验

2011 年 11 月 – 2012 年 5 月 实习研究助理, 马克斯普朗克信息学研究所，人机交互实验室, 德国萨尔布吕肯.

2012 年 11 月 – 2015 年 2 月 研究助理, 数学图像分析组, 萨尔大学计算机学院, 德国萨尔布吕肯.

2015 年 3 月 – 2015 年 12 月 实习研究助理, 影像部计算机辅助医疗干预组, 德国癌症研究中心, 德国海德堡.

2015 年 12 月 – 现在 研究助理, 神经信息处理中心, 乌尔姆大学, 德国乌尔姆.

项目经历 (从 2011 年)

计算机视觉 基于核方法的路标牌探测和识别.

人机交互 基于优化的方法提升平板电脑文字输入.

三维建模 基于最近点迭代算法和 **RGBD** 摄像机.

图像还原 采用各向异性扩散方程对三维 **CT** 图像去噪声.

高阶耦合变分模型 .
- Sobolev 空间连续性理论
- 集散模型数值分析：新型有限差分模型和唯一解理论
- 图像分析上的应用

图像分割 一种基于 **level-set** 的新型边缘检测器.

生物医学工程 用于内窥镜图像理解的多频谱材质特征组织分类.

人体行为分析 认知损伤仿真，老年人运动机能仿真，多模态数据库（视频，音频，动作捕捉等）.

人体行为分析 基于运动的方向感丧失识别.
- 三维人体追踪
- 运动轨迹和强度分析
- 情景特征提取和细粒度动作分析
- 动作一致性建模
- 较目前最先进的方法（包括深度学习的方法）表现更好

人体行为分析 连续活动分析和行为早期检测.
- 新型的动作-情景模式提取
- 新型的积累型训练方法
- 不需要处理整段视频即知即将发生的动作

人体行为分析 基于动态聚类的时序动作分割.
- 新型的聚类算法
- 快速，通用，非监督且不需要额外训练数据
- 较目前最先进的算法表现更好

人体行为分析 基于层次动态聚类的人体动作解析.
- 继承了动态聚类的优点
- 晕倒/摔倒非监督检测
- 较目前最先进的算法表现更好

人体动作分析 自适应震荡网络和在行人追踪上的应用.

软件工程 **MITK** 模块开发（**git** · **C++** · **QT**）.

软件工程 **SSI** 开发，设计和开发数据采集实验系统（**git** · **C++** · **OpenCV**）.

发表文献和报告

- A. Oulasvirta, A. Reichel, W. Li, Y. Zhang, M. Bachynskyi et al. Two-thumb text entry on touchscreen devices. (CHI'13), April 2013.
- M. Bildhauer, M. Fuchs, J. Weickert, Y. Zhang. An Alternative Approach Towards The Higher-Order Denoising of Images. (manuscript of 60 pages for a mathematical journal), 2013-2014
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- Yan Zhang et al. "Tissue classification for laparoscopic image understanding based on multispectral texture analysis." Journal of Medical Imaging 4.1 (2017): 015001.
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- Yan Zhang, et al. "Visual Confusion Recognition in Movement Patterns from Walking Path and Motion Energy." International Conference on Smart Homes and Health Telematics. Springer, Cham, 2017.
- Yan Zhang, Georg Layher, and Heiko Neumann. "Continuous activity understanding based on accumulative pose-context visual patterns." 2017 Seventh International Conference on Image Processing Theory, Tools and Applications (IPTA) . IEEE, 2017.
- Yan Zhang, He Sun, Siyu Tang, Heiko Neumann. "Temporal Human Action Segmentation via Dynamic Clustering." arXiv preprint arXiv:1803.05790 (2018).

语言

中文	母语	
英文	熟练	听说读写，能与外国人流畅沟通
德文	基本	基本应用 *Telc B1*

专业能力

编程	C/C++, CUDA, OpenCV, Matlab, Python, Cython, Tensorflow, Caffe
系统	Unix/Linux, Android, IOS
软件	Latex, Git, Eclipse, Cmake, CAD, Pro/E
其他	Charted Financial Analyst Level-1