Date: Dec 7, 2021

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| **Title** | Wang, D. D., Qian, Z., Vukicevic, M., Engelhardt, S., Kheradvar, A., Zhang, C., ... & Vannan, M. A. (2021). 3D printing, computational modeling, and artificial intelligence for structural heart disease. JACC: Cardiovascular Imaging, 14(1), 41-60. |
| **Area info** | * In transcatheter SHD interventions, the absence of a gold-standard open cavity surgical field deprives physicians of the opportunity for tactile feedback and visual confirmation of cardiac anatomy. * Adaptation of 3-dimensional (3D) printing in clinical care and procedural planning has demonstrated a reduction in early-operator learning curve for transcatheter interventions. * **3D printing in structure heart disease:**   + **Transcatheter aortic valve replacement (TAVR，经导管主动脉瓣置换术) interventions:** pre-procedural planning, the sizing of TAVR devices, and the estimation of possible risks for paravalvular leak; **CT data**   <https://www.mayoclinic.org/tests-procedures/transcatheter-aortic-valve-replacement/about/pac-20384698>   * + **Percutaneous mitral valve repair (经皮二尖瓣修复术):** transesophageal echocardiographic data   + Transcatheter mitral valve replacement (TMVR, **经导管二尖瓣置换术**): CT data   + Left atrial appendage (LAA) closure (**左心耳封堵术**): helped pave understanding of the different LAA device-specific landing zones within patients’ specific anatomy, and assisted in optimizing device sizing, and catheter and device selection; CT data   + Transcatheter tricuspid valve repair and replacement (**经导管三尖瓣修补术和置换术**): 3D transesophageal echocardiogram (TEE), a combination of 3D TEE and CT data   + Patient education；improved understanding and feedback * **Current limitation**: cannot mimic both the appearance and the mechanical property of the living organ; * **Role of AI:**   + Hyperrealism, a sort of augmented reality for training   + Training of interventionalists and interventional imaging physicians: auto-matic image quality grading, auto- mated skill assessment   + achieve fast and accurate segmentation in a clinically actionable time frame   + AI could be used to structure, share, and retrieve massive amounts of collected operative video, intraoperative imaging, and electronic medical records across many surgeons and interventionists around the world |
| **Notes** | * Structural heart interventions require in-depth understanding of cardiac pathophysiology. * 3D printing can decrease the early-operator learning curve for new technology adaptation. * Computational fluid modeling has potential to emulate dynamic physical and physiological properties of cardiac pathophysiology. * Application of AI has potential for patient-specific anatomic replica procedural simulation training. |
| **Comments** | * From technical view, there are also some research points about multi-modality-image based segmentation, and video-based surgery skill assessment that worth paying attention. |

Date: Dec 9, 2021

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| **Title** | Cheng K, Ma Y, Sun B, et al. Depth Estimation for Colonoscopy Images with Self-supervised Learning from Videos[C]//International Conference on Medical Image Computing and Computer-Assisted Intervention. Springer, Cham, 2021: 119-128. |
| **Area info** | * Depth estimation in colonoscopy images provides geometric clues for downstream medical analysis tasks, such as polyp detection, 3D reconstruction, and diagnosis * Compared with natural scenes where groundtruth depth can be obtained using depth cameras or LiDARs, acquiring the ground-truth depth for colonoscopy videos is arduous. * xx |
| **Notes** | * contribution   + novelty |
| **Comments** | * Give some comments |

Date: Dec 9, 2021

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| **Title** | Rau A, Edwards P J E, Ahmad O F, et al. Implicit domain adaptation with conditional generative adversarial networks for depth prediction in endoscopy[J]. International journal of computer assisted radiology and surgery, 2019, 14(7): 1167-1176. |
| **Area info** | * xx |
| **Notes** | * propose to train a cGAN to translate real colonoscopy images to depth maps * Because training data are difficult to obtain during endoscopy, we avoid the necessity of paired colonoscopy images and corresponding depth maps altogether * we propose to **train a pix2pix network on paired simulated data and unlabelled real images**. * Prepare the Synthetic dataset   + We generate synthetic data based on a human CT colonography (CTC) scan (Fig. 1) from which we extract a surface mesh using manual segmentation and meshing.   + To render RGB endoscopic simulation images and corresponding depth maps, an environment developed using the game engine Unity is used.   + A virtual camera with two attached light sources, one on each side of the camera, can be scripted to follow a desired path through the virtual model with varying textures and lighting conditions; * Prepare the real validation data: 目的是找到真实图片对应的unity系统中的深度图片   + Unity系统：大量数据pair（摄像头位置-假图片-深度信息图），以及有若干marker   + da Vinci系统：若干真图片，且有若干marker，   + 以上两个系统的marker是一一对应的，这是两个系统对应上的基础   + 流程：da Vinci系统中的图片A，基于Procrustes analysis方法通过marker位置计算得到图片A对应的摄像头位置；在这个位置获得相应的假图片以及深度信息图；这样就得到了da Vinci系统的真实图片（当然还是假的手术）对应的深度信息图。   + 上述过程比较繁琐，该paper只采集了16个2d图。 |
| **Comments** | * NA |

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| **Title** |  |
| **Area info** | * Something may be cited in the future   + Xx * xx |
| **Notes** | * contribution   + novelty |
| **Comments** | * Give some comments |