Sidra Hanif

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Interests

Conditional guided image generation, handwriting analysis with writing order recovery, weakly supervised object detection, and retrieval algorithms.

Education

Ph.D. in Computer and Information Science, Temple University, PA, USA   **2017-2023**
Focus: Computer Vision applications and image generation   *Advisor: Dr. Longin Jan Latecki*

M.Sc, B.Sc ‖ Electrical Engineering, University of Engineering and Technology, Lahore   **2016, 2008**
Focus: Computer Vision for satellite images

Experience

alwaysAI   **Sep 2023-Present**
ML Engineer   *San Diego, CA, USA*

- **Bring Your Own Architeture BYOA**

  - We optimized the state-of-the-art model architectures (YOLO Static, YOLO Dynamic, and YOLO Classic) to solve the real-world problems for our clients.
  - Many computer vision engineers have their own model architecture preferences outside of YOLO by alwaysAI. To increase our platform flexibility, we also introduced our exclusive Bring Your Own Architecture feature.
  - alwaysAI now supports several new model architectures and even has the functionality to support any PyTorch-based architecture such as transformers and LLMs.

Temple University   **Sep 2017- Dec 2022**
Graduate Research Assistant   *Philadelphia, PA, USA*

- **Unconstrained stroke trajectory recovery [1] ,[2] https://github.com/sidrahhanif/unconstraint_STR**

  - Devised a robust word detection framework by fusing the unsupervised character-region scores with the input images achieving mAP@0.5 = 92.2 and mAP@0.5:0.95 = 64.0 for full-page handwritten document images.
  - Implemented a word-level stroke trajectory recovery network with Dynamic Time Warping (DTW) and chamfer distance loss. This scheme improved the stroke trajectory recovery by 36.7% for the unconstrained handwritten text.
  - Introduced a handwriting recognition-based self-supervised evaluation method for monitoring the accuracy of real-time applications. It gives us 24% accuracy in stroke trajectory recovery for camera-captured handwriting images.

- **Handwriting Imitation [5]**

  - We introduced a character attention feature fusion with words for improving the local style characteristics for handwriting imitation.
  - We employed a character shape projection loss which pays attention to the local shape characteristics of the handwriting. This system gives us 12.9% improved character shapes compared to the state-of-the-art methods of handwriting image generation.

- **Image retrieval for similar objects [4] https://github.com/sidrahhanif/Object_similarity_retrieval**

  - Designed a framework for the user-defined object of interest in the query image. It localizes the object of interest in database images and recommends images with similar objects.
  - On natural images, the retrieval rate is 76.5% as compared to 70% provided by the state-of-the-art method. Also, the correct retrieval rate improves by 17.8% by performing object localization for image ranking.

- **Greeting card's datasets [3]**

  - We introduced a multimodal greeting cards dataset comprising of 3700+ unique images and text pairs. The proposed dataset is also useful for generating greeting card images using a text-to-image generation model.

Quantum Design   **May 2019 – August 2019 ‖ July 2023 – Sep. 2023**
Image Processing Intern   *San Diego, CA, USA*

- **Cantilever detection and keypoint estimation**

  - Collected the training and testing dataset of microscopic images with human intervention. Manually labeled the ground truth for objects and key-points detection.

- Localize objects in microscopic images using single-shot detection algorithm performing with 100% accuracy for mAP@0.5.
- Estimated the key-points in nanoscale images using the multi-order difference of distance loss function for triangularly arranged key-points with 90% detection rate.

Al-Khwarizmi Institute of Computer Science, PK   Mar. 2014 – Sep. 2015

Research Assistant   *Lahore, Pakistan*

- **Automated building detection** [6]
  - Developed an automated building detection framework for dense urban scenes of multi-temporal Google Earth imagery. For the same detection accuracy **86%**, it reduced the false alarms by **40%** and repeated detection by **20%**.
  - Implemented a web service using **C++ .NET Framework** for automated acquisition of weather data from MODIS (Moderate Resolution Imaging Spectroradiometer) for disease surveillance.

Publications

[1] S Hanif, LJ Latecki *Strokes Trajectory Recovery for Unconstrained Handwritten Documents with Automatic Evaluation*, 12th International Conference on Pattern Recognition Applications and Methods (ICPRAM 2023), pages 661-671, ISBN: 978-989-758-626-2; ISSN: 2184-4313.

[2] S Hanif, LJ Latecki *Autonomous Character Region Score Fusion for Word Detection in Camera-captured Handwriting Documents*, Document Intelligence workshop, ACM SIGKDD 2022.

[3] S Hanif, LJ Latecki *Weakly Supervised Annotations for Multi-modal Greeting Cards Dataset*, Pretraining Large Vision and Multimodal Models Workshop at WACV 2023 (poster presentation) arXiv preprint arXiv:2212.00847.

[4] S Hanif,C Li, A Alazzawe LJ Latecki *Image Retrieval with Similar Object Detection and Local Similarity to Detected Objects*, 16th Pacific Rim International Conference on Artificial Intelligence (PRICAI 2019), Cuvu, Yanuca Island, Fiji, August 26-30, 2019, Proceedings, Part III 16, Pages 42-55.

[5] S Hanif, LJ Latecki *MS-CAP: Probabilistic Diffusion Model Conditioned on Multi-Scale ChAracter Pairs for Style Transfer in Handwriting Strokes Generation*, Submitted to ACM transaction on Graphics, 2024.

[6] S Hanif, MN, Ayyaz *Automated building detection framework for dense urban multi-temporal Google earth imagery scenes*, 2016.

Technical Skills

Languages: Python, Java, C/C++,JavaScript,
Developer Tools: PyTorch, Caffe, Tensorflow, MatconvNet, OpenCV, PyCharm
Technologies/Frameworks: Linux, GitHub, CUDA, $\mathcal{L}$atex

Awards and Activities

- Reviewer for European conference on artificial intelligence (ECAI) 2023; Journal Electronic Imaging, SPIE. (2018); CVIU, Elsevier (2019)
- Research grant, Signed.com, 2022
- GHC student scholarship, 2020
- Amazon Research Award travel grant for re:MARS, 2019
- NSF travel grant for PRICAI 2019; travel grant and volunteer at SIG KDD 2022
- Director of members engagement, CST GSO, Temple University, 2022-2023