Peijie Chen

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Biography: Peijie Chen is pursuing his Ph.D. in the Department of Computer Science and Software Engineering at Auburn University. His journey into Artificial Intelligence began with the landmark event of AlphaGo triumphing over Lee Sedol, sparking a deep fascination in this field. Peijie has a solid signal processing foundation, holding an undergraduate degree in Telecommunication Engineering and a Master's degree in Electrical Engineering. His foray into deep learning research is diverse, encompassing object detection, explainable AI, and multi-modal learning. Peijie's academic path reflects a blend of rigorous engineering disciplines and a keen interest in the evolving landscape of AI technologies.

EDUCATION

Auburn University, Auburn, AL   2018 - current
Ph.D. in Computer Science under the supervision of Prof. Anh Nguyen.

Auburn University, Auburn, AL   2015 - 2017
M.S. in Electrical Engineering

Shenzhen University, Shenzhen, China   2010 - 2014
B.S. in Telecommunication Engineering

WORK EXPERIENCE

Noteworthy AI Intern   Sep 2022 - Dec 2022
Machine Learning Engineer   *Connecticut, US*

As an AI/ML development team intern, my primary role involved developing and enhancing object detection/segmentation models and defect detection algorithms. I actively contributed to designing and implementing processes for efficient data collection, which is vital for training robust models. Collaborating closely with the engineering team, I was key in deploying these algorithms and models, ensuring seamless integration into production environments. Additionally, I created compelling demos and presentations, effectively communicating the product's capabilities to potential customers. This role required a harmonious blend of technical proficiency, teamwork, and client interaction skills, providing me with a comprehensive understanding of the AI/ML development lifecycle.

NSF Research Experiences for Undergraduates on Smart UAVs   May 2021 - July 2021
Research Assistant   *Auburn University*

As a Research Assistant for the Smart UAVs undergraduate project, I primarily supported students with logistics, mentorship, and machine learning challenges. My responsibilities included streamlining project logistics, guiding students through their research, and providing targeted assistance with machine learning applications in UAV technology. I focused on offering practical advice and problem-solving strategies to help students overcome technical hurdles, fostering a productive and educational research environment. My contribution aimed to ensure a smooth research process and enrich the student's understanding and application of machine learning in UAV technology.

BooJum Studio   2017 - 2018
Co-founder   *Shenzhen, China*

In traditional art design, the journey to a final client-approved design is often lengthy and iterative, marked by extensive back-and-forth interactions between designers and clients. Recognizing this, we established a startup studio to revolutionize this process. We streamline and enhance the design refinement stages by leveraging advanced machine learning and image processing technologies. Our approach uniquely positions us to generate a wide array of automatically created design options at each

iteration, significantly reducing the time to reach the final design. This expedites the creative process and broadens the scope for client choices, ensuring a more efficient, client-centric, and innovative design experience.

Shenzhen Xun Fang Telecom — a Huawei's company   May 2014 - Sep 2014
Intern   *Shenzhen, China*

Maintained and optimized the code of the networking system of the 3G service-provider (WCDMA) service.

COMMUNITY SERVICE

K-6 AI club [Website]   Sep 2022 - Apr 2023
volunteer   *Auburn Univeristy*

I volunteered at the K6 AI Club, founded by Prof. Anh Nguyen of Auburn University's CSSE department, to inspire elementary school children (K-6) in mathematics, coding, robotics, and artificial intelligence. This pioneering and free educational initiative, supported by Auburn University and an NSF CAREER award, meets weekly and is the first of its kind in Auburn and Alabama. During the Spring 2023 term, I, alongside a team of Computer Science students, directly engaged with 15-20 kids every Thursday, introducing them to cutting-edge AI applications and core concepts. We facilitated hands-on activities, including coding challenges and robot interactions, to foster an early interest and foundational understanding of AI and related technologies.

PUBLICATIONS   Google Scholar

NAACL

· Peijie Chen, Thang Pham, Tin Nguyen, Seunghyun Yoon, Trung Bui, Anh Nguyen (2024). PEEB: Part-based bird classifiers with an explainable and editable language bottleneck [pdf | Code | Demo]

Under Review

· Tin Nguyen, Peijie Chen, Anh Nguyen (2023). Leveraging Habitat Information for Fine-grained Bird Identification [pdf | Code]

Under Review

· Pooyan Rahmanzadehgervi, Hung Huy Nguyen, Peijie Chen, Long Mai, Anh Nguyen (2023). Co-Attention Bottleneck: Explainable and Causal Attention Emerged from Transformers Trained to Detect Images Changes [pdf]

ACCV (Oral)

· Peijie Chen, Qi Li, Saad Biaz, Trung Bui, A Nguyen (2022). gScoreCAM: What is CLIP looking at? [pdf | Code | Colab demo]

Our proposed method is 10x faster than the SoTA method on visualizing the least multimodal (CLIP), and 5-20% better compared to traditional visualizing methods. With our proposed method, we find that some attacks of the model like *typographic attack* are misinterpreted.

Under review

· Mehdi Nourelahi, Lars Kotthoff, Peijie Chen, A Nguyen (2022). How explainable are adversarially-robust CNNs? [pdf]

Conducted a thorough and systematic analysis of 9 feature importance methods on 12 different networks. We find that GradCAM and RISE is the best method among them.

arXiv

- P Chen, C Agarwal, A Nguyen (2021). The shape and simplicity biases of adversarially robust ImageNet-trained CNNs [pdf | code]

  We find that a robust network not only has more shape bias, it actually becomes more simply (monotonous) at the neuron level. And this monotonicity not only provides robustness to the model, but also allows it to do better in transfer learning.

ChinaCom

- L Wang, P Chen, C Wang (2019). Layer-Wise Entropy Analysis and Visualization of Neurons Activation [pdf]

  Though the analysis of entropy in the classifier, we found that we could use entropy to measure the quality of MLP layers in a network. In addition, entropy can be used to predict if the accuracy will drop when we prune the network.

OTHER ROJECTS

Weakly-supervised generation of text description for bounding boxes in chest X-rays

Modern CNN-based radiology has reached an impressive human-comparable level of x-ray screening. However, there are often no explanations for a model's predicted findings (e.g., pneumonia or left lower-lobe collapse) for an x-ray. This challenge inhibits validating, understanding, and trusting the decision-making process of an Artificial Intelligence (AI) radiologist and how they interact with human users. We built the first system that explains each of the findings predicted by AI by integrating the MIMIC-CXR-trained models which, for a given x-ray image, outputs a textual report (without explanations), CLIP, and saliency map
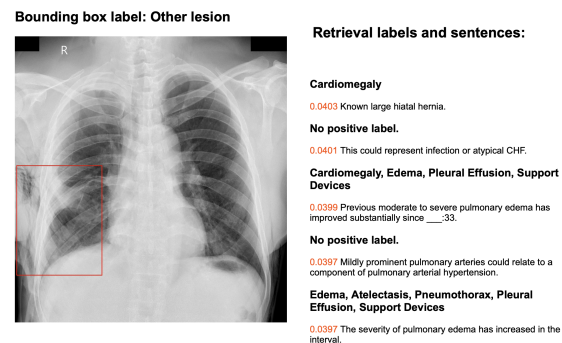
- methods.

Figure 1: For each prediction of the model, we find the corresponding report that best matches the (possible) lesions tissues.