Yongsong Yang

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Research Interest: Multi-Agent System; Embodied AI;
Multimodal Learning; State Estimation

EDUCATION EXPERIENCE

M.Eng. in Mechanics.   **Harbin Institute of Technology (C9, 985, 211)**   Sep 2021 -Jul 2023

Major Courses: Fundamentals of Modern Mathematics; Numerical Analysis; Vehicle Experiment Design and Data Processing; Modern control Theory and Application; Intelligent Control

B.Eng. in Vehicle Engineering.   **China University of Petroleum (East China) (211)**   Sep 2017 - Jul 2021

Major Courses: Fundamentals of Computer; Practical Program Design (Python); Fundamental of Automotive Computer Aided Engineering; Computer Aided Designed in Mechanics

PUBLICATIONS

[2] **Y. Yang,** Y Xu, Y. Nie, J. Li, L. Zhao, C. Zhang*, Q. Yu*. "Deep transfer learning enables battery state of charge and state of health estimation," **Energy**, vol. 294, no. February, p. 130779, 2024, **(Top, JCR Q1, IF=9).**

[1] **Y. Yang,** L. Zhao, Q. Yu*, et al. "State of charge estimation for lithium-ion batteries based on cross-domain transfer learning with feedback mechanism," **J. Energy Storage**, vol. 70, no. 2, p. 108037, 2023, **(Top, JCR Q1, IF=8.9, ESI Highly Cited).**

PATENTS

[2] **Y. Yang**, S. Long, Q. Long. An active inflation-based sealing structure for vehicles, ZL202422231094.5.

[1] Q. Yu*, **Y. Yang,** Z. Li. A reconstruction method toward sparse big data of power battery, ZL2023106096628.

RESEARCH EXPERIENCE

Agent-Based Intelligent Customer Service based on Qwen-2.5 and RAG

Implementation
Jun 2025 – Jul 2025

- Applied Qwen-1.5B for intent recognition (query) and semantic rewriting.
- Hybrid retrieval strategy was utilized to combine semantic search (60%), keywords (15%), and SQL (25%) for precise data fetching.
- Qwen-14B was implemented to synthesize all inputs into a coherent response.
- Managed multi-step processes in state machine, while calling functions to response.
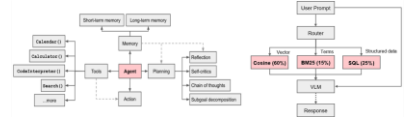
Fine-tuning and Preference Alignment based on Qwen-2.5-VL-Instruct

Implementation
Jun 2025 – Jun 2025

- Built a Vision Language Model (Qwen-2.5-VL) to accomplish image-to-text tasks.
- Utilized PEFT and prompt to fine-tune model and got better specific task adaption.
- Applied AWQ via high quality seed data to reduce model size by 75% around.
- Gathered preference datasets and implemented the DPO for preference matching.

Quantized Prompt-guided Video Generation via Stable Video Diffusion Model

Optimization
Mar 2025 - Jun 2025

- Built the stable video diffusion (SVD) model, and implemented a quantization strategy, reducing the model size by 65% through converting weights from to INT8.
- Fine-tuned the SVD model using Low-Rank Adaptation (LoRA), optimizing the loss between predicted and actual noise to enhance generation quality.
- Processed CLIP text embeddings and random noise through a U-Net with cross-attention mechanisms, ensuring alignment between prompts and frames.
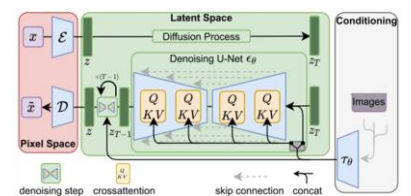
3D Image Segmentation based on Distilled Separate Anything Model

Optimization
Feb 2025 - Mar 2025

- For efficient medical image segmentation, segment anything model (SAM) was re-built on multimodal medical datasets, achieving robust performance.
- To address the challenge of high computational costs while maintaining accuracy, image encoder TinyViT was distilled from the original ViT by imposing the image embedding outputs to be the same.
- The results validated LiteSAM's ability to deliver accurate segmentation with reduced resource requirements.
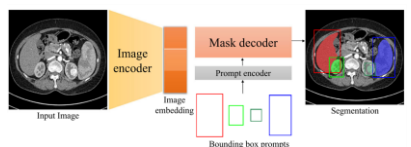
Dual-timescale Joint States Estimation based on Transfer Learning

Institute of Intelligent Electric Vehicles, Weihai

- For State of Health (SOH) estimation, an Ada-CNN-GRU-Ave model was developed utilizing dual-time scale inputs and achieving an MAE of 0.02%, significantly outperforming traditional methods.
- To enable joint SOC and SOH estimation, a Joint Adaptive Deep Transfer Learning (JADTL) model was introduced leveraging previous states output and current characteristics input. By combining Ada-CNN-GRU-KF and Ada-CNN-GRU-Ave, the model achieved MAE of 0.99% (SOC) and 0.07% (SOH).
- To decrease data redundancy and computational burden in SOH estimation, a novel sampling strategy (0.1 Hz) and averaging post-processor were implemented, achieving a balance between computational burden and accuracy.
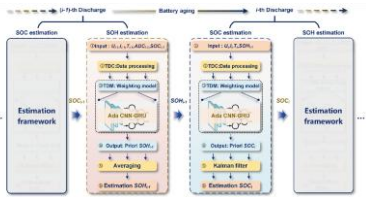

Sparse Data Reconstruction based on Masked Auto-Encoder with extrapolator

Institute of Intelligent Electric Vehicles, Weihai

- To address the challenge of limited computational resource in edge devices and cloud transmission bandwidth, this study proposes an Extrapolator Masked Autoencoder (ExtraMAE) framework for data reconstruction.
- Masked time series data with 80% ratio, then employed a GRU-based self-supervised learning encoder to capture temporal feature from unmasked patches.
- Recovered latent representations through feature-space interpolation by an extrapolator, and reconstructed dense time series from a GRU-based decoder while preserving original unmasked values.
- The model enabled downstream SOC estimation with MAE of 0.29% on the reconstructed data - outperforming the estimation MAE of 1.50% under sparse data.
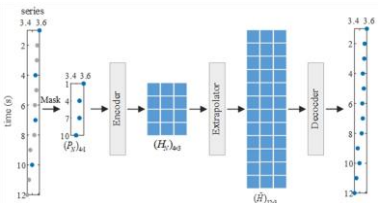

State Estimation based on Cross Domain Transfer Learning

Institute of Intelligent Electric Vehicles, Weihai

- To extract features from multidimensional time series, CNN was implemented for spatial feature capture while GRU was utilized for temporal dependency capture.
- For the generalization of SOC estimation under varying conditions, a distilled Ada-CNN-GRU was proposed by reducing source-target domain distribution diversity, achieving sub-1% MAE under dynamic driving cycles.
- Kalman filter was employed as post processor to decrease fluctuations.
- A novel feedback mechanism was implemented to predict and correct systematic errors. By training a secondary model to estimate SOC errors and feeding them back as inputs, the framework reduced estimation inaccuracies.
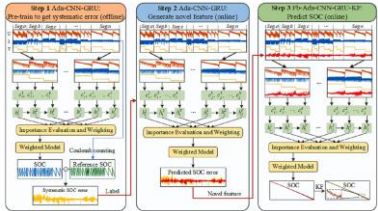
SKILLS

- **Professional Skills:** Qwen-VL; LangChain; LangGraph; SD; MAE; SAM; VMamba; YOLO; Unet; CNN; GRU
- **Programming Skills:** Python; MATLAB; C Language
- **Language Skills:** English (**IELTS: 6.5**); Mandarin (Native)

WORK EXPERIENCE

BYD Company Limited

- Led cross departments integration of vehicle subsystems (electronics, chassis, powertrain) to achieve seamless interoperability while keeping balance among key vehicle attributes, such as: intelligence, comfort, cost, etc.
- Performed system-level trade-off analysis by-data driven feature learning, and reduced integration conflicts by 40% while accelerated platform validation cycles by 25%.

PRIZE & AWARDS

- **"Annual Patent Innovation award"** from BYD Ltd. — Jan 2025
- **"Outstanding Fresh Graduate"** from BYD Ltd. — Jul 2024
- **"3rd class University Scholarship"** from Harbin Institute of Technology — Sep 2022
- **"2nd class University Scholarship"** from Harbin Institute of Technology — Sep 2021