Qiong **Wang**

COMPUTER SCIENCE · BOSTON UNIVERSITY

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Education

Boston University   *Boston, US*
M.S. in Computer Science   *Sep. 2023 - May. 2025*

Zhengzhou University   *Zhengzhou, China*
B.A. in Art (Visual Transmission Designing)   *Sep. 2007 - June. 2011*

Publication

- Cao, Z., Shan, J., Jiang, X., **Wang, Q.**, McAlindon, T., Driban, J. B., Zhang, M. *Enhancing Hand Osteoarthritis Classification with Generative AI: A CycleGAN and EfficientNetB7 Approach.* The American College of Rheumatology (ACR) Annual Meeting 2025. Submitted.

- Qin, S., **Wang, Q.**, Shan, J., Driban, J., McAlindon, T., Wang, K., Zhang, M. *Enhancing Bone Marrow Lesion Segmentation through Dual-Channel Deep Neural Networks and Test-Time Augmentation.* IEEE Journal of Biomedical and Health Informatics. Submitted.

- Qin, S., **Wang, Q.**, Shan, J., Driban, J. B., Zhang, M. *Optimized Deep Learning Method for Automated Segmentation of Bone Marrow Lesions.* The Osteoarthritis Research Society International (OARSI) 2025 Conference. Accepted.

- **Wang, Q.**, Zhang, M. *A Novel Machine Learning Model to Predict Knee Replacement*. Manuscript in preparation.

Academic Positions

- **Research Assistant**, Artificial Intelligence & Computer Vision (AICV) Lab at Boston University   *2024 - Present*
- **Teaching Assistant**, CS566 Analysis of Algorithms, Boston University   *Fall 2024, Spring 2025*

Research Projects

Enhancing Hand Osteoarthritis Classification with Generative AI: *AICV Lab*
A CycleGAN and EfficientNetB7 Approach   *Sep. 2024 – May.2025*

ADVISOR: Prof. Ming Zhang, Prof. Juan Shan

Developed a CycleGAN-based pipeline to synthesize severe KL3/KL4 OA joint images from mild KL0/KL1 X-rays, addressing class imbalance in OA classification. Customized CycleGAN training with unpaired domain mappings (KL0→KL3, KL1→KL4), identity loss constraints, and adversarial + cycle-consistency loss to ensure structural fidelity. Tuned generator/discriminator architectures and tested multiple synthetic-to-real mixing ratios. Integrated synthetic images into EfficientNetB7 training for DIP joint classification, achieving 6.0% and 3.1% accuracy improvements for KL3 and KL4, respectively, while preserving morphological and textural realism in generated samples.

NLP and Gen AI Modeling with Sentence Transformer and   *Boston University*
Mistral-7B   *Apr.2025*

ADVISOR: Prof. Mikhail Chertushkin

Developed a two-stage QA system consisting of a dense retriever model and a Mistral-7B based generator model. Fine-tuned the retriever using Sentence Transformer (distilbert-base-uncased) with a custom AutoModel + Pooling architecture, optimized via Multiple Negatives Ranking Loss on sentence-pair similarity tasks. Built a custom Data Loader using the Input Example for efficient training. Fine-tuned the generator using Mistral-7B to produce coherent answers from retrieved passages. Achieved a final evaluation score of 0.38, measured by the average of retriever precision, recall, and generator BLEU score.

Enhancing BML Segmentation through Dual-Channel Deep Neural Networks and Test-Time augmentation

AICV Lab
Jan. 2024 – Mar.2025

ADVISOR: Prof. Ming Zhang

Designed and implemented a Test-Time Augmentation (TTA) pipeline to improve bone marrow lesion (BML) segmentation from IWFS MR images in the OAI dataset. Evaluated deep learning models including Residual U-Net, SwinUNetR, AttentionUNet, and U-Net++. The TTA pipeline incorporated flipping-based transformations, inverse recovery, pixel-wise voting, and morphological post-processing, leading to a 69.0% Dice score with the modified U-Net++, outperforming all other models.

Breast Cancer Detection via Attention-Enhanced ImprovedUNet for Multi-Class Breast Ultrasound Image Segmentation

Boston University
Feb. 2025

ADVISOR: Prof. Mikhail Chertushkin

Designed a modified U-Net architecture (ImprovedUNet) tailored for multi-class breast ultrasound segmentation using a public dataset of 780 annotated images. Integrated attention mechanisms within skip connections to enhance lesion boundary focus and suppress background noise. Employed the AdamW optimizer with weight decay and a cosine annealing learning rate scheduler to improve generalization and convergence. Applied comprehensive preprocessing and augmentation techniques (resizing, normalization, class-aware sampling) to address class imbalance. Improved the weighted mean Dice coefficient from 0.53927 to 0.78649, demonstrating the effectiveness of architectural and training enhancements.

A Novel Machine Learning Model to Predict Knee Replacement Base on Logistic Regression, Decision Tree, Random Forest, SVM, XGBoost, ANN, RNN, and CNN

AICV Lab
Jun. 2024 - Present

ADVISOR: Prof. Ming Zhang, Prof. Juan Shan

Designed and optimized a suite of machine learning models—including Logistic Regression, Decision Tree, Random Forest, SVM, XGBoost, CatBoost, and KNN—to predict knee replacement (KR) needs in osteoarthritis patients. Engineered MRI-derived features (e.g., bone marrow lesions, cartilage damage index, and effusion) to improve predictive performance. Conducted SHAP-based feature importance analysis, sanity checks, and permutation testing, followed by ensemble learning and hyperparameter tuning with GridSearchCV. Applied K-Fold Cross-Validation to enhance model generalizability, improving AUC from 65% to 75%.

Neural Machine Translation with Luong Attention for Sequence Alignment

Boston University
2025

ADVISOR: Prof. Mikhail Chertushkin

Implemented a Seq2Seq architecture with Luong attention to enhance source-target alignment by computing context vectors via dot-product scoring between encoder states and the decoder's current state. Integrated attention-weighted representations at each decoding step to capture long-range dependencies and improve translation coherence. Employed teacher forcing and sequence-level loss optimization, achieving a BLEU score of 30.26, with training and validation losses of 1.96 and 2.80, respectively.

Binary Classification with CatBoost and Stratified Cross-Validation for Early Outcome Prediction

Boston University
2025

ADVISOR: Prof. Mikhail Chertushkin

Built a robust binary classifier on structured tabular data using CatBoost to predict early outcomes. Performed comprehensive feature engineering, including statistical selection and domain-informed filtering, followed by standardization with StandardScaler. Compared multiple models (Logistic Regression, SVM, XGBoost, and CatBoost), with CatBoost achieving the best performance. Applied Stratified K-Fold Cross-Validation and hyperparameter tuning via RandomizedSearchCV to enhance generalization. Conducted SHAP analysis to interpret feature contributions and improve model transparency. Achieved an AUC score of 0.81919, demonstrating strong predictive performance and interpretability.

iLab consumables Management Project

Boston University

Position: Full Stack Software Engineer

Oct. 2023 - Jan. 2024

Designed and developed a full-stack system for Harvard University's biological laboratory to assist researchers in ordering and managing lab consumables, aiming to improve workflow efficiency. Implemented server-side logic in Java for inventory tracking, order processing, and user account management. Created RESTful APIs and established a PostgreSQL database for data storage

and integration. Built a responsive front-end using React.js with a user-friendly interface and cross-device accessibility. Ensured data integrity through robust database architecture and implemented backup solutions for disaster recovery.

Work Experiences

ByteDance Technology Co. LTD (TikTok)   *Shanghai, China, Feb. 2021-Dec.2022*
- AI Video Batch Clipping and Editing Project
- Machine Learning Model Video Search Project

Infinite Travel (Entrepreneurial Venture)   *Beijing, China, May.2013-Oct.2015*
Position: Founder & CEO

Vivian Pearl (Entrepreneurial Venture)   *Beijing, China, May.2013-Oct.2015*
Position: Founder & CEO

Honors & Awards

- **The Seed Research Grant**   *Boston University, 2024 – 2025*
- **Outstanding Project Achievement Award**   *TikTok, Oct. 2022*
- **Permanent Member, ByteDance Strategic Advisory Committee**   *TikTok, 2021-2022*
- **Excellence in Individual Contribution Award**   *TikTok, Nov. 2021*
- **Achieved Acquisition of Vivian Pearl Brand for 700,000 RMB**   *Oct. 2015*
- **Raised 200,000 RMB in Angel Investment for Infinite Travel APP**   *Dec. 2013*

Courses & Skills

Main Courses:	**Languages:**	**Tools/Frameworks:**
CS555 Foundation of Machine Learning	R	RStudio
CS566 Analysis of Algorithm	Python	Jupyter Notebook
CS579 Database Management	SQL	MySQL
CS575 Operating Systems	C++, Java, Python	Linux
CS677 Data Science with Python	Python	NumPy, Scikit-learn, Pandas, Keras, XGBoost
CS665 Software Design and Patterns	Java	IntelliJ IDEA, Git
CS248 Discrete Mathematics		
CS472 Computer Architecture		
CS662 Computer Language Theory		
CS767 Advanced Machine Learning and Neural Networks		PyTorch, Docker, Flask, MongoDB, Wandb