Yuming Zhao

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EDUCATION

Beijing Normal University, School of Artificial Intelligence, Beijing, China   Sept.2021 – Jun.2024 (Expected)
MS in Computer Applied Technology (Current GPA: 3.6/4.0)

Beijing Normal University, School of Artificial Intelligence, Beijing, China   Sept.2017 – Jun.2021
BSc in Computer Science and Technology (GPA: 3.6/4.0)

Cardiff University, Cardiff, UK   Jul.2019 – Aug.2019
Summer School in Big Data and High-Performance Computing

RESEARCH EXPERIENCE

Beijing Normal University, School of Artificial Intelligence, Beijing, China
Master Degree Candidate (Supervisor: Prof. Zhongke Wu)   Sept.2021 – Present
B-spline Curve Blending
- Proposed a B-spline curve blending method based on piecewise polynomial, and completed the theoretical derivation and formula derivation.
- Implemented the proposed B-spline curve blending method, and compared it with common curve blending methods. The results indicate that our method improves the fairness of the blending curve.
- Completed a paper *Blending B-Spline Curves by Piecewise Polynomial*, submitted for publication.

Ball B-spline Curve Blending
- Proposed a Ball B-Spline Curve (BBSC) blending method based on B-spline. Extended the blending method of B-spline curve to BBSC.
- Proposed the strain energy function of BBSC and discretized the strain energy function of BBSC to the expression about control balls. Optimized strain energy function under continuity condition constraints and control ball radius constraints.
- Implemented the proposed BBSC blending method, and compared it with common BBSC blending methods. The results indicate that our method improves the fairness of the blending curve.
- Completed a paper *G2 Blending Ball B-Spline Curve by B-Spline*, which has been accepted by ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games 2023.

B-spline Curve Fitting on N-dimensional Sphere
- Proposed a novel progressive iterative approximation method based on geodesic least squares (GLS-PIA) for fitting B-spline curves on N-dimensional sphere.
- Proposed an adaptive knot placement method based on geodesic difference to enhance the capability of B-spline curves in capturing complex data details on N-dimensional sphere.
- Implemented the proposed B-spline curve fitting method on N-dimensional sphere based on MATLAB, and compared it with common N-dimensional sphere B-spline curve fitting method. The results indicate that our method achieves a better result on fairness and accuracy.
- Completed a paper *GLS-PIA: N-Dimensional Spherical B-Spline Curve Fitting based on Geodesic Least Square with Adaptive Knot Placement*, submitted for publication.

Beijing Normal University, School of Artificial Intelligence, Beijing, China
Undergraduate Research Assistant   Sept.2017 – Jun.2021
Indoor Scene Construction Based on Multimodal Input (PIs: Prof. Zhongke Wu & Prof. Xingce Wang)
- Developed of the furniture model retrieval module.
- Collected and integrated furniture datasets with labels, models, and rendered images. Established a Furniture Model Database based on SQL Server.
- Designed a novel joint furniture model retrieval method based on speech and sketch.
- A patent entered the substantive examination: *A Joint Furniture Model Retrieval Method based on Speech and Sketch*.

Brain Tumor Segmentation and Visualization (PI: Prof. Yanlin Luo)
- Performed data augmentation on Brats19.
- Used U-net like networks for brain tumor segmentation on the Brat19 dataset.
- Used volume rendering method based on Ray Casting to visualize the segmentation results of brain tumor.

INTERNSHIP EXPERIENCE

Cloud Database Group, Du Xiaoman Financial (also known as Baidu Financial Services Group), Beijing, China

Cloud Database Engineer Oct.2022 – Dec.2022

- Daily monitoring and operation maintenance of cloud databases.
- Developed cloud database autonomous services, including automatic master-slave switching.

INDIVIDUAL PROJECT

Beijing Normal University, Beijing, China

Offline Physically Based Renderer

- Implemented a renderer based on **Radiosity Method** using C++and OpenGL.
- Implemented a renderer based on **Path Tracing** using C++and OpenGL.
- Used OpenMP parallel computing to accelerate ray tracing rendering speed.

A Mobile Schedule Recognition & Generation Interactive Application

- A mobile schedule recognition & generation interactive application has been developed, which can recognize, generate and save schedule information from Chat log screenshots and Email screenshots..
- Use Baidu AI Service to implement the **Optical Character Recognition (OCR)** part to identify text information from screenshots; Use Baidu AI Service to implement the **Named Entity Recognition (NER)** part to recognize and generate schedule from text information.
- Complete UI design and application development on Android.

TEACHING EXPERIENCE

Beijing Normal University, Beijing, China

Teaching Assistant for COMPUTER GRAPHICS course

- Designed experimental homework and gave lectures.
- The main content includes: Introduction to OpenGL, Basic Rendering with OpenGL, Phong's Shading and RayTracing.

Teaching Assistant for Lab Interns

- Provided basic scientific research training for undergraduate interns in the laboratory.
- The main content includes: Basic Machine Learning, Code Development Specification, Literature Search&Reading.

TECHNICAL SKILLS

Math: Riemannian geometry, Calculus, Linear algebra, Probability and Mathematical statistics.

Computer Graphics: Common geometric modeling and geometry processing methods (B-spline Curve&Surface, Mesh, Point Cloud); Common rendering methods (Radiosity Method, Photo Mapping, Ray Tracing, Volume rendering); Some fluid simulation methods (SPH, LBM).

Software: C++, Python, MATLAB, Blender, CAD, Rhino, OpenGL, Qt framework

Language: English (Fluent), Mandarin (Native)

AWARDS

- Graduate Academic Scholarship of Beijing Normal University Oct.2022
- Undergraduate Scholarship of Beijing Normal University Oct.2020
- Undergraduate Scholarship of Beijing Normal University Oct.2019
- Undergraduate Scholarship of Beijing Normal University Oct.2018

PUBLICATION AND MANUSCRIPT

Published Paper

- **Yuming Zhao**, Zhongke Wu, Xingce Wang, and Xinyue Liu. 2023. G2 Blending Ball B-Spline Curve by B-Spline. Proc. ACM Comput. Graph. Interact. Tech. 6, 1, Article 13 (May 2023), 16 pages. https://doi.org/10.1145/3585504

Manuscript

- **Yuming Zhao**, Zhongke Wu, Xingce Wang, and Xinyue Liu. Blending B-Spline Curves by Piecewise Polynomial (submitted)
- **Yuming Zhao**, Zhongke Wu, and Xingce Wang. GLS-PIA: N-Dimensional Spherical B-Spline Curve Fitting based on Geodesic Least Square with Adaptive Knot Placement (submitted)

Conference Talk

- **Yuming Zhao**, Zhongke Wu, Xingce Wang, and Xinyue Liu. 2023. G2 Blending Ball B-Spline Curve by B-Spline. ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games Bellevue, WA, United States: 3-5 May, 2023

Patent

- **Yuming Zhao**, Zhongke Wu, Xingce Wang. A Joint Furniture Model Retrieval Method based on Speech and Sketch (substantive examination)