Yufei Shan

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my website

Academic Interests

My research interests: Gaussian Process, Dirichlet process, geometric analysis, conformal geometry, CR-geometry, symmetric spaces, microlocal analysis, semiclassical microlocal analysis, representations of Lie groups and Lie algebras, etc.

Besides my research, I am also interested in the Markov chain Monte Carlo computation method, Nonparametric Bayesian Methods which I think will be very helpful in the financial area. I am really eager to apply my knowledge of mathematics and computer science into some practical areas.

Education

University of California, Santa Cruz

- Ph.D. in Mathematics (expected August 2022).
- Dissertation: Asymptotically Symmetric metrics and Ricci Flows
- Advisor: Jie Qing.

University of Science and Technology of China

- M.Sc. in Mathematics (09/2015 - 06/2017).
- Thesis: The upper bound for the eigenvalue of the Laplace-Beltrami operator on $\mathbf{S}^2$
- Advisor: Zuoqin Wang

Sichuan University

- B.S. in Mathematics and Applied Mathematics (09/2011 - 06/2015)

Data Related Projects

1. **Fit the relations between the sales of TV and advertising ways (by TV, radio, newspaper)** (joint with Dongzhou Yu). website.
    - used the **linear regression model** to fit the relations between the sales of TV and advertising ways (by TV, radio, newspaper)
    - evaluated this model by the **RMSE** metric.
    - explained the meaning of the coefficients in the linear regression model.

[1] Updated July 5, 2022

Computer Science Related Projects

1. **Ticket+: Java Web Service Development-Event Search and Ticket Recommendation** (joint with Yiyi Zhu). website.

   - Developed an interactive web page for users to search events and purchase tickets.
   - Improved personalized business recommendation based on search history and favorite records.
   - Created Java servlets with **RESTful** APIs to handle HTTP requests and responses.
   - Built relational (**MySQL**) and non-relational database (**MongoDB**), to obtain real business data from Yelp API.
   - Designed algorithms (e.g., **content-based recommendation**) to implement business recommendation.
   - Deployed server to **Amazon EC2** to handle 150 queries per second tested by Apache JMeter
   - Designed an interactive web page utilizing **AJAX** technology (**HTML, CSS and JavaScript**).

Research Experiences

2. **The Heat Kernel Estimate on the Asymptotically Hyperbolic Manifolds and the Stability of the Asymptotically Hyperbolic Einstein Manifolds on the Ricci flow** (joint with Jie Qing). Status (in prep). More details

   - Studied the relations between the heat kernel of Lichnerowicz Laplacian and the long time existence and the convergence of the Ricci flow based on the result of R.Bamler.
   - Studied the relations between the heat kernel and resolvent of Lichnerowicz Laplacian (This is a direct corollary of the spectrum theorem) and tried to get the estimate of the heat kernel of Lichnerowicz Laplacian by the corresponding Schwartz kernel of that. By the work of X.Chen and A.Hassell, in order to get a good estimate of the heat kernel of Lichnerowicz Laplacian, we need a tensor version result of R.B.Melrose, A.S.Barreto and A.Vasy.
   - Trying to generalized the result of R.B.Melrose, A.S.Barreto, A.Vasy about the Schwartz kernel estimate from the Laplacian operator on the function to the Lichnerowicz Laplacian on the symmetric two tensor.

1. **The Perturbation Existence and the Stability of Conformally Compact Einstein Manifolds under the Ricci flow** (joint with Jie Qing). Status (in prep). A draft of my paper about these results

   - Recovered J. Lee's result (See the Theorem A) about the perturbation Existence of the conformally compact Einstein manifolds by the Ricci flow
   - Improved the result of J.Qing, Y.Shi and J.Wu (See Theorem 1.3) about the stability of conformally compact Einstein manifolds.

Invited Talks

2. *05/13/2021*. Mathematical Colloquium, UC Santa Cruz, The Heat Kernel Estimate on the Asymptotically Hyperbolic Manifold and the Stability of the Asymptotically Hyperbolic Einstein Manifold, The link for slices.

1. *08/08/2019*. Geometric Analysis and Mathematical General Relativity Seminar, Peking University, Asymptotically Symmetric Space and the Ricci Flow, The link for slices.

Teaching Experience

University of California, Santa Cruz

- **Instructor:**
  - **Math121A** Differential Geometry (2019 Spring)
- **Teaching Assistant:**
  - **Math19A** Calculus for Science, Engineering, and Mathematics (2017 Fall, 2018 Summer, 2019 Fall, 2021 Spring)
  - **Math19B** Calculus for Science, Engineering, and Mathematics (2018 Winter, 2020 Winter, 2021 Winter)
  - **Math23A** Calculus for Science, Engineering, and Mathematics (2018 Spring, 2020 Spring, 2020 Summer, 2021 Fall)
  - **Math23B** Calculus for Science, Engineering, and Mathematics (2020 Fall, 2022 Spring)
  - **Math21** Linear algebra (2018 Fall)
  - **Math106** Ordinary Differential Equation (2019 Winter)
  - **Math100** Introduction to Proof and Problem Solving (2019 Summer)
  - **Math115** Graph Theory (2020 Summer)
  - **Math145** Introductory Chaos Theory (2022 Winter)

Awards

- 09/2016: The first-class Graduate Student Scholarship of University of Science and Technology of China
- 11/2014: The Second-class Single Scholarship of Sichuan University
- 11/2013: The First Prize of the 5th Chinese Mathematics Competitions (CMC) (Sichuan Division) .