

SIAM Activity Group on Data Science Charter Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Data Science. The SIAM Activity Group on Data Mining and Analytics was originally formed under the aegis of SIAM on July 17, 2011 by the SIAM Council and by the SIAM Board of Trustees. The charter was renewed by the council and board four times between 2011 and 2019. The SIAM Activity Group (or SIAG) to which this renewal applies was formally restructured under the aegis of SIAM in June by the SIAM Council and the SIAM Board of Trustees, with its initial operating period beginning January 1, 2021 and ending December 31, 2021.

This SIAG has 1654 members, including 960 student members, as of December 31, 2023.

The aim of the SIAM Activity Group on Data Science (SIAG/DATA) is to advance the mathematics of data science, to highlight the importance and benefits of data science, to bring data science innovations to other areas of applied mathematics, and to identify and explore the connections between data science and other applied sciences. The SIAG focuses on the mathematical, statistical and computer science foundations of data science, and on applications of data science to other fields of science and across technology and society. Within the framework of SIAM, the SIAG will conduct activities that implement its purposes.

The SIAG on Data Science will organize activities in data science. The SIAG is expected to:

1. Organize minisymposia at the SIAM Annual Meeting.
2. At least once every five years, either organize a track of at least six minisymposia at the SIAM Annual Meeting or have an activity group meeting held jointly with the annual meeting. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chair.
3. Organize a biennial conference on the Mathematics of Data Science (MDS). The program director and chair of the SIAG are responsible for ensuring the continuity of MDS. The program director of the SIAG or designate will usually be a co-chair of the conference, and additional co-chairs will be selected by the chair, the program director and the other officers of the SIAG. The organizing committee must be approved by the VP for Programs at least 16 months before the conference.
4. The SIAG also sponsors the annual SIAM International Conference on Data Mining (SDM) and works with the Steering Committee of the conference to support its organization.

The SIAG has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG.

List all current officers of the activity group (including advisory board, if relevant).

Chair: Ilse Ipsen

Vice Chair: Lars Ruthotto

Program Director: David F. Gleich

Secretary: Stefanie Guenther

1. *How is the field covered by the activity group doing? Is it growing, is the focus shifting? What have been the significant advances over the last two years?*

The new SIAG/DATA complements and strengthens other SIAM initiatives in the emerging data science field, including the *SIAM Journal on Mathematics of Data Science (SIMODS)* and the *SIAM Book Series on Data Science*, and the *SIAM Conference on Mathematics of Data Science (MDS)*, which was first held online in 2020. The field of data science has only increased in importance and visibility within applied and computational mathematics and across virtually all other fields of science, technology, and society.

Judging by MDS22 feedback, topics that deserve increased attention include topological data analysis, interpretability and mathematics of machine learning (ML), optimization for data science, physics-based ML, and application-driven work.

2. *How is the activity group doing? Is it remaining vibrant? Is the size of the SIAG stable or increasing? How is the SIAG keeping up with the changes in the field? How are the broader interests of SIAM reflected in the activities of the SIAG?*

In spite of its youth, the SIAG/DATA is the second largest activity group, with a steadily rising non-student membership currently at 42 percent.

More specifically, total SIAG membership increased from 1,513 in 2020 to 1,767 in 2021, followed by a slight decrease to 1,654 members in 2022. This decrease is due to a decline in student membership from 1,009 in 2020 down to 960 in 2022. However, non-student membership has been monotonically increasing from 504 in 2020, to 652 in 2021, and up to 694 members in 2022.

3. *Please list conferences/workshops the activity group has sponsored or co-sponsored over the past two years, and give a brief (one sentence or phrase) indication of the success or problems with each.*

MDS 2022 was the first in-person MDS conference since COVID consigned MDS 2020 to a virtual format. MDS 2022 was held in a hybrid format, in San Diego, US, with 1,200 participants, of whom about 2/3 were on site. The co-chairs Lior Horesh (IBM), Lars Ruthotto (SIAG/DATA Vice Chair), and Karen Willcox (UT Austin, US), organized a highly successful and energetic meeting that boasted 168 minisymposia (up from 158 in 2020), 20 contributed sessions, 8 minitutorials, and 11 broader engagement sessions. The co-chairs secured funding from industry and academia, which made a reception for the lively poster session possible, and 6 best poster prizes.

The hybrid format is clearly a challenge. Judging by the feedback from MDS 2022 conference attendees, the hybrid format for minisymposia caused technical confusion and did not always work well, and in-person attendees were not happy about the remote talks. However, the remote participants clearly appreciated the hybrid format.

The SIAG also sponsors the annual SIAM International Conference on Data Mining (SDM) and works with the Steering Committee of the conference to support its organization. The SDM 2021

and 2022 were held virtually, with 412 and 212 participants, respectively. SDM23 took place in April 2023 in Minneapolis, MN, US.

4. *Please indicate the number of minisymposia directly organized by the activity group at the last two SIAM annual meetings. When did the SIAG last organize a track at an annual meeting or meet jointly with the SIAM Annual Meeting?*

Because of the number of Activity Groups, the current guidelines are that an Activity Group should organize a track about every seven (7) Annual Meetings or meet jointly with the Annual Meeting within a seven (7) meeting period.

SIAG/DATA has not organized minisymposia at the last two SIAM Annual Meetings. Note that the first in-person MDS conference was held in Fall 2022, the 2023 Annual Meeting is skipped in favor of ICIAM 2023, and the next MDS conference will take place in 2024. A special SIAG/DATA track is planned for the 2025 Annual Meeting.

5. *Please indicate other activities sponsored by the activity group, to include newsletters, prizes and web sites. Have each of these been active and successful?*

- Tim Chartier (Davidson College, US) was appointed as the SIAM News liaison for SIAG/DATA.
- The SIAG/DATA Early Career Prize was presented to Weijie Su (University of Pennsylvania, US) at MDS 2022.
- Preliminary discussions were held with the *SIMODS* EIC and section editor about strengthening the ties between the journal and SIAG.
- As a first step, Daniela Cialfi (University G.D'Annunzio, Chieti Pescara, Italy) compiled a list of presentation videos corresponding to recent *SIMODS* papers on *SIAM Engage*, 6 September 2022:

<https://engage.siam.org/discussion/presentations-for-simods-papers?ReturnUrl=%2fcommunities%2fcommunity-home%2fdigestviewer%3fcommunitykey%3d31956aa3-d01a-4574-9c74-90ae239d19c8>

The SIAG/DATA generated frequent coverage in SIAM News:

- Lior Horesh, Lars Ruhotto, and Karen E. Wilcox: MDS22 Will Showcase the Latest Advances in the Mathematics of Data Science in San Diego (and Online), 6 July 2022
<https://sinews.siam.org/Details-Page/mds22-will-showcase-the-latest-advances-in-the-mathematics-of-data-science-in-san-diego-and-online>
- Lina Sorg: Panel Discussion at MDS22 Prepares Students and Early-Career Researchers for the Workforce, 1 November 2022
<https://sinews.siam.org/Details-Page/panel-discussion-at-mds22-prepares-students-and-early-career-researchers-for-the-workforce>
- Lina Sorg: MDS22 Panel Addresses the Complex Interplay Between Academic and Industry, 1 November 2022
<https://sinews.siam.org/Details-Page/mds22-panel-addresses-the-complex-interplay-between-academia-and-industry>

- Malena Español, Shelby Horth, Mary Ann Leung, and Victoria Uribe: Broader Engagement Program Expands to the 2022 SIAM Conference on Mathematics of Data Science, 1 December 2022
<https://sinews.siam.org/Details-Page/broader-engagement-program-expands-to-the-2022-siam-conference-on-mathematics-of-data-science>
- Wotao Yin, Daniel McKenzie, and Samy Wu Fung: Learning to Optimize: Where Deep Learning Meets Optimization and Inverse Problems, 12 December 2022
<https://sinews.siam.org/details-page/learning-to-optimize-where-deep-learning-meets-optimization-and-inverse-problems>
- Tim Chartier: Reflections on March Madness, 3 April 2023
<https://sinews.siam.org/Details-Page/reflections-on-march-mathness>

6. *What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.*

- The nominations for the SIAG/Data Career and Early Career Prizes opened on 1 May 2023. We hope to receive sufficient nominations to award for the first time the *SIAG/DATA Career Prize* to an outstanding senior researcher who has made broad and influential contributions to the Mathematical, Statistical, or Computational foundations of Data Science.
- MDS 2024 will take place in Atlanta, US, in May. The co-chairs are Eric Chi (Rice University, US), David Gleich (SIAG/DATA Program Director), and Rachel Ward (UT Austin, US).
- A SIAG/DATA track is planned for the 2025 Annual Meeting.
- A joint DATA/IS co-located conference will take place in 2026 at a location outside North America. The selection of conference location and date is coordinated by a joint DATA/IS committee consisting of Becca Willett (SIAG/IS Vice Chair), Hongkai Zhao (SIAG/IS Chair), David Gleich (SIAG/DATA Program Director), and Tia Chung (SIAG/DATA representative). The search for a location is currently underway. The 2024 SIAG/DATA Program Director will be one of the co-chairs.

7. *How can SIAM help the activity group achieve its goals?*

We are grateful to SIAM for being highly supportive of the growth of the SIAG/DATA, through *SIAM News* coverage and *SIAM Engage* channels, through its support for the career prizes and conference organization.

We will be in touch with SIAM Staff regarding strategies to increase SIAG/DATA membership, particularly outside the US, as the current level of non-US membership is only 12% of the total. We would appreciate SIAM's help in tapping the potential SIAM members in various other SIAGs with existing or emerging research interests in data science, thereby strengthening the SIAG/DATA's connections to other SIAGs. We hope that this could also contribute to increasing the number of women in the SIAG/DATA. The current percentage of women among non-student members is only 20 percent, and among student members, it is 28 percent.

We would also appreciate it if SIAM could increase its presence at leading machine learning conferences (NeurIPS, ICML, AAAI) and advertise the SIAG/DATA activity group, the SIMODS journal, the MDS and SDM conferences, and its Data Science book series.

8. *How can the activity group help SIAM in its general role of promoting data science?*

The SIAG/DATA aims to be a powerful force in promoting the role of applied and computational mathematics within data science. To this end, the SIAG will collaborate with the SIMODS journal, the SIAM book series on Data Science, and the SDM and MDS conferences. The SIAG will continue to promote data science innovations through various communication channels, such as SIAM News and SIAM Engage. We believe that SIAG/DATA and its activities have strong potential to attract new members to SIAM.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2024.

Signed,

Ilse C. F. Ipsen, Chair of the SIAG on Data Science, 11 May 2023