SIAM Activity Group on Data Science

Charter Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group (or SIAG) on Data Science. The SIAG on Data Science (SIAG/DATA) to which this renewal applies was formed in June 2020 by the SIAM Council and the SIAM Board of Trustees, with its initial operating period beginning January 1, 2021 and ending December 31, 2021. The SIAG is a continuation and broadening of the SIAG on Data Mining and Analytics (SIAG/DMA), which was originally formed on July 17, 2011 by the SIAM Council and by the SIAM Board of Trustees. The charter of SIAG/DMA was renewed by the council and board four times between 2011 and 2019.

This SIAG has 1,513 members, including 1,009 student members, as of December 31, 2020.

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: Hans De Sterck
Vice Chair: Gitta Kutyniok
Program Director: Karen Willcox
Secretary: Danai Koutra

For the first year of operation of the rescoped SIAG on Data Science, the initial slate of officers was appointed (similar to the procedure for a new SIAG), and the initial charter application was for only one year. Elections for new SIAG officers will be held in the Fall of 2021, and the current charter application covers the two-year period 2022-2023, during which the newly elected officers will be in office.

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?*

In recent years, the broad area of "data science" has taken off tremendously in terms of reach and scope, with a strong and growing impact in basic and applied research and many new groundbreaking applications across society. Mathematics, statistics, and computer science lie at the foundation of data science, and as such, it was realized by many in the society that SIAM needs a dedicated SIAG home for the quickly growing field of data science. For this reason, it was proposed in 2020 to broaden and rename the existing SIAM Activity Group on Data Mining and Analytics (SIAG/DMA) into the SIAM Activity Group on Data Science (SIAG/DATA). The new SIAG/DATA complements and strengthens other recent initiatives that SIAM has taken in the emerging data science field, including the new SIAM Journal on Mathematics of Data Science (SIMODS), which was launched in 2019, and the new SIAM Conference on Mathematics of Data Science (MDS), which was first held online in May-June 2020. In the year that has passed since the previous charter renewal, 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. It is widely recognized within SIAM that it is important for the society to have a SIAG dedicated to this emerging field; substantial growth is expected for SIAM in this area.

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 its first year of operation, the SIAG has seen an increase in its membership from 1,289 to 1,513. The re-scoping of SIAG/DMA to SIAG/DATA was announced in October 2020 in SIAM News and SIAM Unwrapped, which resulted in some membership growth during

the annual renewal process at the end of 2020 but, we expect there is still a lot of untapped potential for growing the membership. Substantial growth is expected to happen naturally around the next MDS conference (currently being planned for Fall 2022), and some growth is also expected during the Fall 2021 membership renewal process as a result of further awareness of the new SIAG/DATA that we pursue through SIAM News. The current officers plan to pursue more avenues with SIAM staff during the remainder of 2021 to make the general SIAM membership aware of the new SIAG/DATA and attract additional SIAG members. We are currently exploring ways to increase the SIAG membership by Fall 2021 (as far as feasible) to give more SIAM members interested in Data Science a voice in the election of the new SIAG/DATA officers for 2022-2023.

> 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.*

The (new) flagship conference of the (new) SIAG/DATA is the two-yearly SIAM Conference on Mathematics of Data Science (MDS). The new SIAM MDS conference was scheduled to be held May 5 - 9, 2020, in Cincinnati, Ohio, US. MDS was on track to become a large and high-quality conference even at its first installment, with 158 minisymposia, 152 contributed talks, 38 poster submissions, and an outstanding list of plenary speakers. Due to COVID, the conference was shifted to a virtual format from May 4 - June 30, 2020, as one of the first SIAM conferences to go virtual. The virtual sessions were well-attended and set the stage for the roll-out of other virtual SIAM conferences in the subsequent year.

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. SDM21 was held online from April 29 - May 1, 2021. The conference continued its successful run as a high-quality, selective venue for advances in data mining. SDM20 was canceled due to the COVID outbreak. However, the conference proceedings with accepted papers for SDM20 were published, and about 35 of the SDM20 papers were presented at SDM21. A Doctoral Forum Posters and Mentoring Session were held online at SDM21.

> 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 and its predecessor SIAG/DMA have not directly organized minisymposia at the two most recent SIAM annual meetings. The broadening to SIAG/DATA is an excellent opportunity to seek a special track at a future SIAM Annual Meeting. Since the SIAG's flagship MDS conference will be held in the Fall of 2022 and 2023 is an ICIAM

year, we anticipate a SIAG/DATA special track at the 2024 or 2025 annual meetings. Since data science is now such an active research topic and SIAM has many members in its various subdisciplines who are actively engaging in exciting new research in the data science area, we expect there will be substantial interest from members of the renewed SIAG to present their work at the SIAM annual meeting, where we believe it will find a very receptive audience, given the current broad interest across the society in data science topics and results.

> *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?*

The SIAG officers have in 2021 proposed two new SIAG prizes, and the SIAM Council has approved these two prizes. The new SIAG/DATA Early Career Prize will be awarded to an outstanding early career researcher in the Mathematics of Data Science for distinguished contributions to the field in the six calendar years prior to the year of the award. The SIAG/DATA Career Prize will be awarded to an outstanding senior researcher who has made broad and influential contributions to the Mathematical, Statistical, or Computational foundations of Data Science. The prize recognizes a research career in the Mathematics of Data Science at the highest level of achievement. The data science area did previously not have SIAM major or SIAG prizes. Having these two SIAG prizes in data science will be important in putting SIAM and SIAG/DATA on the map in the data science world, and we believe a major SIAM prize should be added in the future. These new prizes will be first presented at the 2022 Mathematics of Data Science (MDS) conference.

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

SIAG/DATA's flagship Mathematics of Data Science (MDS) conference is currently being scheduled for the fall of 2022, with current SIAG program director Karen Willcox as one of the co-chairs. The conference format will be extended from 4 to 5 days due to the success of the first MDS conference and the extensive interest in the conference that is expected from large parts of the SIAM community. The two new SIAG prizes that have been proposed to and approved by the SIAM Council in 2021 will be presented at the 2022 MDS conference.

In terms of planning further into the future, the newly elected program director for 1/1/2022 will become a co-chair for the next MDS conference to be held in May 2024, having the opportunity to observe how MDS-22 unfolds in May 2022. The program officer elected for 1/1/2022, together with the other officers, will also be in charge of site selection for the 2026 MDS conference since conference locations for large conferences need to be secured three or more years in advance. The program director elected for 1/1/2024 will be a co-chair for MDS-26 and will select, with the other officers, the site for MDS-28.

The SIAG will also continue to sponsor the more specialized yearly SIAM Data Mining (SDM) conferences (SDM22 and SDM23), working with the Steering Committee of the conference to support its organization and maintain the high scientific profile of the conference.

Furthermore, the SIAG will also continue to build out member communication through the new Engage platform and will consider establishing a regular newsletter or similar communication channel, and will continue to pursue exposure through SIAM News with the help of a dedicated SIAM News liaison.

The SIAG will also consider establishing a "SIAM major award" in the data science area, and a best paper award.

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

SIAM has been highly supportive of the aims and goals of the new SIAG/DATA activity group, through its SIAM News and SIAM Unwrapped channels, and through its support for the new prizes the SIAG has proposed and for the organization of the 2022 MDS conference. Through the rest of 2021 and beyond, we will be in touch with SIAM staff regarding strategies to increase the membership of the SIAG since there is still extensive untapped potential of SIAM members in various others SIAGs that have existing or emerging research interests in data science.

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

Needless to say, data science has quickly become one of the great quantitative endeavors of our time, with tremendous innovations in all areas of science, technology, and society-at-large that are based on foundations in mathematics, statistics, and computer science. SIAM has made important strides in the data science field with the new SIMODS journal and the new MDS conference, and the new SIAG/DATA aims to be a powerful vehicle for SIAM in promoting the crucial role of applied mathematics and computational science play in data science advances across society. For example, the SIAG will continue to promote data science innovations by the SIAM community through various communication channels, including special issues on data science in SIAM News and related initiatives. Along these lines, 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, 2022.

Signed,

Hans De Sterck, Chair of the SIAG on Data Science, May 14, 2021