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Date: 2023-01-15
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Project: Programming Language C++, SG19 Machine Learning
Reply to: Michael Wong <michael@codeplay.com>

SG19: Machine Learning Meeting Minutes 2022/12/08-2023/01/12

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Minutes for 2022/12/08 SG19 Conference Call

On Wed, Dec 7, 2022 at 2:07 PM Michael Wong <fraggamuffin_at_[hidden]> wrote:

- > Hi all, SG19 Machine Learning meeting will focus on graphs, as agreed as
- > we want to drive graph to completion until year end. But we will also
- > continue discussing Stats. The next stats paper has been published:
- > P2681R0
- > <<https://www.open-std.org/jtc1/sc22/wg21/docs/papers/2022/p2681r0.pdf>> More
- > Stats Functions Richard Dosselmann
- > Michael Wong is inviting
- > you to a scheduled Zoom meeting.
- >
- > Topic: SG19 monthly
- > Time: 02:00 PM Eastern Time (US and Canada)
- > Every month on the Second Thu,
- >
- >
- > Join from PC, Mac, Linux, iOS or Android:
- >
- > <https://iso.zoom.us/j/93084591725?pwd=K3QxZjJlcnljaE13ZWU5cTILNkx0Zz09>
- > Password: 035530
- >

- > Or iPhone one-tap :
- > US: +13017158592,,93084591725# or +13126266799,,93084591725#
- > Or Telephone:
- > Dial(for higher quality, dial a number based on your current location):
- > US: +1 301 715 8592 or +1 312 626 6799 or +1 346 248 7799 or +1
- > 408 638 0968 or +1 646 876 9923 or +1 669 900 6833 or +1 253 215 8782
- > or 877 853 5247 (Toll Free)
- > Meeting ID: 930 8459 1725
- > Password: 035530
- > International numbers available: <https://iso.zoom.us/j/93084591725>
- >
- > Or Skype for Business (Lync):
- > <https://iso.zoom.us/j/93084591725>
- >
- > Agenda:
- >
- > 1. Opening and introductions
- >
- > The ISO Code of conduct:
- > <https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100397.pdf>
- >
- > IEC Code of Conduct:
- >
- > <https://www.iec.ch/basecamp/iec-code-conduct-technical-work>
- >
- > ISO patent policy.
- >
- >
- > https://isotc.iso.org/livelink/livelink/fetch/2000/2122/3770791/Common_Policy.htm?nodeid=6344764&vernum=-2
- >
- > The WG21 Practices and Procedures and Code of Conduct:
- >
- > <https://isocpp.org/std/standing-documents/sd-4-wg21-practices-and-procedures>
- >
- > 1.1 Roll call of participants
- >
- Guy, Andrew, Richard, Phil, Michael, Kevin Deweese, Nathan Owen, Scott McMillan
- >

- > 1.2 Adopt agenda
- >
- > 1.3 Approve minutes from previous meeting, and approve publishing
- > previously approved minutes to ISO CPP.org
- >
- > 1.4 Action items from previous meetings
- >
- > 2. Main issues (125 min)
- >
- > 2.1 General logistics
- >
- > Meeting plan, focus on one paper per meeting but does not preclude other
- > paper
- > updates:
- >
- > CPPCON minutes:
- > <https://wiki.edg.com/bin/view/Wg21virtual2022-07/SG14>
- >
- >
- > Nov 10, 2022 02:00 PM ET: Cancelled due to Kona F2F
- > Dec 8, 2022 02:00 PM ET: Graph
- > Jan 12, 2023 02:00 PM ET: Stats
- > Feb 9, 2023 02:00 PM ET: Graph
- > Mar 9, 2023 02:00 PM ET: Matrix, RL and DC
- >
- >
- > ISO future meeting status
- >
- 2023-02-06 to 11: Issaquah, WA, USA
- <<https://isocpp.org/files/papers/N4925.pdf>>; Standard C++ Foundation,
Edison Design Group, WorldQuant
- (tentative) 2023-06-12 to 17: Varna, Bulgaria; VMware, Chaos

- >
- > 2.2 Paper reviews
- >
- > 2.2.1: ML topics
- >

> 2.2.1.1 Graph Proposal Phil Ratsloff et al

> similar NWgraph. Andrew presenting D1709R4 Breadth first , djksra,

> Bellman-Ford, shortest path algorithm

>

followed python graph library

distances is passed in, algorithm's shortest path needs predecessor passed in

Nathan:

I would be in favor of adding spanning arborescence algorithms, if not already listed, such as Chu–Liu/Edmonds'. Example implementation:

[https://github.com/atofigh/edmonds-
alg/blob/master/src/edmonds_optimum_branching_impl.hpp](https://github.com/atofigh/edmonds-
alg/blob/master/src/edmonds_optimum_branching_impl.hpp)

Paper is getting big

> Latest paper:

>

> Here's a link to the paper (different than the previous paper reviewed).

> There are some additional updates I'm planning on making before the
> meeting.

>

>

> [https://docs.google.com/document/d/1OpH-
xxRri7tJTtJJIZTYmSHkkrZJkdBwm9zJ7LqolfQ/edit?usp=sharing](https://docs.google.com/document/d/1OpH-
xxRri7tJTtJJIZTYmSHkkrZJkdBwm9zJ7LqolfQ/edit?usp=sharing)

>

>

>

>

> P1709R3:

>

> [https://docs.google.com/document/d/1kLHhbSTX7j0tPeTYECQFSNx3R35Mu3xO5-
dyYdRy4dM/edit?usp=sharing](https://docs.google.com/document/d/1kLHhbSTX7j0tPeTYECQFSNx3R35Mu3xO5-
dyYdRy4dM/edit?usp=sharing)

>

>

> <https://docs.google.com/document/d/1QkfDzGyfNQKs86y053M0YHOLP6frzhTJqzg>

[1Ug_vkkE/edit?usp=sharing](#)

- >
- > <<http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2020/p2119r0.html>>
- >
- > <
- >
- > <https://docs.google.com/document/d/175wlm8o4BNGti0WLq8U6uZORegKVjmnpsc-E8PoGS0/edit?ts=5fff27cd#heading=h.9ogkehmdmtel>
- > *>*
- >
- > Array copy semantics:
- > array copy-semantics paper P1997 "Relaxing Restrictions on Arrays",
- > <https://wg21.link/p1997>
- >
- > Stats feedback:
- >
- > P2376R0
- > <<http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2021/p2376r0.pdf>>
- > Comments
- > on Simple Statistical Functions (p1708r4): Contracts, Exceptions and
- > Special cases Johan Lundberg
- >
- > 2.2.1.2 Reinforcement Learning Larry Lewis Jorge Silva
- >
- > Reinforcement Learning proposal:
- >
- > 2.2.1.3 Differential Calculus:
- >
- >
- > <https://docs.google.com/document/d/175wlm8o4BNGti0WLq8U6uZORegKVjmnpsc-E8PoGS0/edit?ts=5fff27cd#heading=h.9ogkehmdmtel>
- >
- > 2.2.1.4: Stats paper
- >
- > P2681R0
- > <<https://www.open-std.org/jtc1/sc22/wg21/docs/papers/2022/p2681r0.pdf>> More
- > Stats Functions Richard Dosselmann, Michael Wong
- >

Feedback from UK

add missing mean, median and mode, bivariate stats
covariance, correlation is worth it, also in python

Linear regression, why not multiple instead of single? smaller scope better, or say we can add later
2 other types of correlation, added to Pierson Correlation, like Spearman's or Kendal's Tau
implementation experience, efficiency?
point to Boost or another public implementation

Current github

- >
- > <https://github.com/cplusplus/papers/issues/475>
- >
- > <https://github.com/cplusplus/papers/issues/979>
- >
- > Stats review Richard Dosselman et al
- >
- > <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2021/p1708r4.pdf>
- >
- > Feedback from Johan Lundberg and Oleksandr Korval
- >
- > <https://isocpp.org/files/papers/D2376R0.pdf>
- >
- > P1708R3: Math proposal for Machine Learning: 3rd review
- >
- > PXXXX: combinatorics: 1st Review
- >
- > *> std.org/jtc1/sc22/wg21/docs/papers/2020/p1708r2
- > <<http://std.org/jtc1/sc22/wg21/docs/papers/2020/p1708r2>>*
- > *> above is the stats paper that was reviewed in Prague*
- > *> <http://wiki.edg.com/bin/view/Wg21prague/P1708R2SG19>
- > <<http://wiki.edg.com/bin/view/Wg21prague/P1708R2SG19>>*
- > *>*
- > *> Review Jolanta Polish feedback.*
- > *> <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2020/p2119r0.html>
- > <<http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2020/p2119r0.html>>*
- >
- >
- > 2.2.1.4: Matrix paper

- >
- > 2.2.3 any other proposal for reviews?
- >
- > 2.3 Other Papers and proposals
- >
- > P1416R1: SG19 - Linear Algebra for Data Science and Machine Learning
- >
- > <https://docs.google.com/document/d/1IKUNiUhBgRURW-UkspK7fAAylhfXuMxjk7xKikK4Yp8/edit#heading=h.tj9hitg7dbtr>
- >
- > P1415: Machine Learning Layered list
- >
- > https://docs.google.com/document/d/1eINFdIXWoetbxjO1OKol_Wj8fyi4Z4hogfj5tLV_Sj64/edit#heading=h.tj9hitg7dbtr
- >
- > 2.2.2 SG14 Linear Algebra progress:
- > Different layers of proposal
- >
- > https://docs.google.com/document/d/1poXfr7mUPovJC9ZQ5SDVM_1Nb6oYAXIK_d0ljdUAtSQ/edit
- >
- > 2.5 Future F2F meetings:
- >
- > 2.6 future C++ Standard meetings:
- > <https://isocpp.org/std/meetings-and-participation/upcoming-meetings>
- >
- > None
- >
- > 3. Any other business
- >
- > New reflector
- >
- > <http://lists.isocpp.org/mailman/listinfo.cgi/sg19>
- >
- > Old Reflector
- > <https://groups.google.com/a/isocpp.org/forum/#!newtopic/sg19>
- > <https://groups.google.com/a/isocpp.org/forum/?fromgroups=#!forum/sg14>
- >
- > Code and proposal Staging area
- >
- > 4. Review

- >
- > 4.1 Review and approve resolutions and issues [e.g., changes to SG's working draft]
- >
- > 4.2 Review action items (5 min)
- >
- > 5. Closing process
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- > 5.1 Establish next agenda
- >
- >
- > 5.2 Future meeting
- >
- >
- >
- >
- > Jan 2, 2022 02:00 PM ET: Stats
- > Feb 9, 2022 02:00 PM ET: Graph
- > mar 9, 2022 02:00 PM ET: Matrix
- >

Minutes for 2023/01/12 SG19 Conference Call

On Wed, Jan 11, 2023 at 2:36 PM Michael Wong <fraggamuffin_at_[hidden]> wrote:

- > Hi all, SG19 Machine Learning meeting will focus on stats.
- > We still want to drive graph to completion until year end.
- > The next stats paper has been published:
- > P2681R0
- > <<https://www.open-std.org/jtc1/sc22/wg21/docs/papers/2022/p2681r0.pdf>>
- > More
- > Stats Functions Richard Dosselmann
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- > Or iPhone one-tap :
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- > 408 638 0968 or +1 646 876 9923 or +1 669 900 6833 or +1 253 215 8782
- > or 877 853 5247 (Toll Free)
- > Meeting ID: 930 8459 1725
- > Password: 035530
- > International numbers available: <https://iso.zoom.us/u/agewu4X97>
- >
- > Or Skype for Business (Lync):
- > <https://iso.zoom.us/skype/93084591725>
- >
- > Agenda:
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- > 1. Opening and introductions
- >
- > The ISO Code of conduct:
- > <https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100397.pdf>
- >
- > IEC Code of Conduct:
- >
- > <https://www.iec.ch/basecamp/iec-code-conduct-technical-work>
- >
- > ISO patent policy.
- >
- >
- > https://isotc.iso.org/livelink/livelink/fetch/2000/2122/3770791/Common_Policy.htm?nodeid=6344764&vernum=-2
- >
- > The WG21 Practices and Procedures and Code of Conduct:
- >
- > <https://isocpp.org/std/standing-documents/sd-4-wg21-practices-and-procedures>

- >
- > 1.1 Roll call of participants
- >
- > Rene Rivera, Benjamin Brock, Boguslaw Cyganek, Guy Davidson, Mhammad Osama, Nathan Owen, Ozan Irsoy, Phil Ratzloff, Richard Dosselmann, Scott McMillan, Vincent Gao, Michael Wong, Jens Maurer, Sam Obeng, Kevin Dewesee, Andrew Lumsdaine
- >
- > 1.2 Adopt agenda
- >
- > 1.3 Approve minutes from previous meeting, and approve publishing
- > previously approved minutes to ISOCPP.org
- >
- > 1.4 Action items from previous meetings
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- > 2. Main issues (125 min)
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- > Nov 10, 2022 02:00 PM ET: Cancelled due to Kona F2F
- > Dec 8, 2022 02:00 PM ET: Graph
- > Jan 12, 2023 02:00 PM ET: Stats
- > Feb 9, 2023 02:00 PM ET: F2F cancelled No plans for us meeting
- > Mar 9, 2023 02:00 PM ET: Matrix
- >
- >
- > ISO meeting status
- > We want SG6 to review P2681 as it has been approved in SG19. But they do
- > not have virtual calls anymore and we want to present it at Issaquah. But
- > we don't know if they plan to meet.
- >

- > future C++ Std meetings
- > <https://isocpp.org/std/meetings-and-participation/upcoming-meetings>
- > 2.2 Paper reviews
- >
- > 2.2.1: ML topics
- >
- > 2.2.1.1 Graph Proposal Phil Ratsloff et al
- >
- > Latest paper:
- >
- > Here's a link to the paper (different than the previous paper reviewed).
- > There are some additional updates I'm planning on making before the
- > meeting.
- >
- >
- > <https://docs.google.com/document/d/1OpH-xxRri7tJTtJJIZTYmSHkkZJkdBwm9zJ7LqolfQ/edit?usp=sharing>
- >
- >
- >
- >
- > P1709R3:
- >
- > <https://docs.google.com/document/d/1kLHhbSTX7j0tPeTYECQFSNx3R35Mu3xO5dyYdRy4dM/edit?usp=sharing>
- >
- >
- > https://docs.google.com/document/d/1QkfDzGyfNQKs86y053M0YHOLP6frzhTJqzq1Ug_vkkE/edit?usp=sharing
- >
- > <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2020/p2119r0.html>>
- >
- > <
- >
- > <https://docs.google.com/document/d/175wIm8o4BNGti0WLq8U6uZORegKVjmnpcf-E8PoGS0/edit?ts=5fff27cd#heading=h.9ogkehmdmtel>
- > *>*
- >
- > Array copy semantics:
- > array copy-semantics paper P1997 "Relaxing Restrictions on Arrays",
- > <https://wg21.link/p1997>

- >
- > Stats feedback:
- >
- > P2376R0
- > <<http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2021/p2376r0.pdf>>
- > Comments
- > on Simple Statistical Functions (p1708r4): Contracts, Exceptions and
- > Special cases Johan Lundberg
- >
- > Meet in Issaquah to discuss CSR graph or start the discussion on reflector to get opinion within this group.
- COmment from Andrew: from NWgraph implementer
- aim for cppcon

2.2.1.2 Reinforcement Learning Larry Lewis Jorge Silva

- >
- > Reinforcement Learning proposal:
- >
- > 2.2.1.3 Differential Calculus:
- >
- >
- > <https://docs.google.com/document/d/175wlm8o4BNGti0WLq8U6uZORegKVjmnpsc-E8PoGS0/edit?ts=5fff27cd#heading=h.9ogkehmdmtel>
- >
- > 2.2.1.4: Stats paper
- >
- > P2681R0
- > <<https://www.open-std.org/jtc1/sc22/wg21/docs/papers/2022/p2681r0.pdf>>
- > More
- > Stats Functions Richard Dosselmann, Michael Wong
- > Current github
- >
- > <https://github.com/cplusplus/papers/issues/475>
- >
- > <https://github.com/cplusplus/papers/issues/979>
- >
- > Stats review Richard Dosselman et al
- >
- > <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2021/p1708r4.pdf>
- >

> Feedback from Johan Lundberg and Oleksandr Korval
>
> <https://isocpp.org/files/papers/D2376R0.pdf>
>
> P1708R3: Math proposal for Machine Learning: 3rd review
>
> PXXXX: combinatorics: 1st Review
>
> *> std.org/jtc1/sc22/wg21/docs/papers/2020/p1708r2
> <<http://std.org/jtc1/sc22/wg21/docs/papers/2020/p1708r2>> *
> *> above is the stats paper that was reviewed in Prague*
> *> <http://wiki.edg.com/bin/view/Wg21prague/P1708R2SG19>
> <<http://wiki.edg.com/bin/view/Wg21prague/P1708R2SG19>> *
> *> *
> *> Review Jolanta Polish feedback.*
> *> <http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2020/p2119r0.html>
> <<http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2020/p2119r0.html>> *
>
> REview based on feedback from John True

D1708R7

4.2 how to deal with overloading when there is similar constructs for accumulator object classes for overloading
dividing the weighted and unweighted is better then overloading

told SG6 combining does not work, and that would be nice to have,

is counting done as int? yes

implementation can be on github, currently shared with michael Chui; need copyright statement that won't taint others from looking at it
license is different: I am the copy of this work, I hold the copyright, I am putting it in the public domain

Boost will require even more scrutiny, care about inside, while Std cares about outside
Probably dont need it

BC: intermediate type ? yes we support that
D2681r1
adds median mode,
correlation

linear regression in future

want the individual value type be convertible
which choice to convert first which seems asymmetric,
as this is notional exposition, so we can have expository only things
shown as italic, meta fn taking 2 ranges, so we can use template alias

put it in for Jan 15 and replace R0 for Issaquah. Need to be in michael's
hand before Sunday Jan 15 10 Am ET.

> 2.2.1.4: Matrix paper

>

> 2.2.3 any other proposal for reviews?

>

> 2.3 Other Papers and proposals

>

> P1416R1: SG19 - Linear Algebra for Data Science and Machine Learning

>

> <https://docs.google.com/document/d/1IKUNiUhBgRURW-UkspK7fAAylhfXuMxjk7xKikK4Yp8/edit#heading=h.tj9hitg7dbtr>

>

> P1415: Machine Learning Layered list

>

> https://docs.google.com/document/d/1eINFdIXWoetbxjO1OKol_Wj8fyi4Z4hogfj5tLV_Sj64/edit#heading=h.tj9hitg7dbtr

>

> 2.2.2 SG14 Linear Algebra progress:

> Different layers of proposal

>

> https://docs.google.com/document/d/1poXfr7mUPovJC9ZQ5SDVM_1Nb6oYAXIK_d0ljdUAtSQ/edit

>

> 2.5 Future F2F meetings:

>

> 2.6 future C++ Standard meetings:

> <https://isocpp.org/std/meetings-and-participation/upcoming-meetings>

>

- > None
- >
- > 3. Any other business
- >
- > New reflector
- >
- > <http://lists.isocpp.org/mailman/listinfo/sg19>
- >
- > Old Reflector
- > <https://groups.google.com/a/isocpp.org/forum/#!newtopic/sg19>
- > <<https://groups.google.com/a/isocpp.org/forum/?fromgroups=#!forum/sg14>>
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