Teaching AI in K-12

2nd Annual AI for K-12 Symposium

AAAI 2019 Fall Symposium Series
November 8th, 2019

Symposium Organizing Committee

Dave Touretzky
Carnegie Mellon
AI for K-12 Working Group Chair

Christina Gardner-McCune
University of Florida
AI For K-12 Working Group Co-Chair

Fred Martin
UMass Lowell
Past CSTA Chair of Board of Directors

Deborah Seehorn
Co-Chair of CSTA Standards Committee

Funding & Sponsorship

Supported by NSF DRL-1846073.

11

Teacher Scholarships

AI in K-12 Symposia Attendees

75

AAAI **2019**
Fall Symposium Series

Largest Symposium

48

AAAI **2018**
Fall Symposium Series

2019 Teaching AI in K-12 Submissions

2 Keynotes	16 Presentations	1 Panel
6 AI Playground Demos	7 Lightning Talks	1 Participatory Activity

K-12 AI Education Community Growth

- AI for K-12 Symposium - AAAI Fall 2018 Symposia, Arlington, VA
- 560+ K-12 Teachers completed ISTE AI Teacher PD Course
- AI4K12 Interest Group List-serv - Over 250 people
  moved to ai4k12@lists.aaai.org
- K12 AI Education workshop (AIED conference, Chicago, May 2019)
- ISTE - 16 AI Talks, Events, and Workshops
- CSTA - 3 AI Breakout Sessions; 2 AI Workshops
- Workshop on Education in Artificial Intelligence K-12 (EduAI)
  IJCAI, Macau, China, Aug. 11, 2019
- 7 NSF Funded K-12 AI Education Projects

K-12 AI Curricula & Professional Development

- ISTE PD - Over 560+ Educators Completed the Course (Sept. 2019)
- ReadyAI: Free AI+ME tutorial for K-5
- 2019 WAICY Competition
- ECS AI Curriculum
- AI4ALL Open Learning Platform
- AI + Ethics (MIT) Curriculum & Standards
- Machine Learning in High School
- Teaching AI book - Michelle Zimmerman

Program Overview

Friday

Welcome

Keynote

Middle And High School AI Curricula, Part I

Break

Middle And High School AI Curricula, Part II

Lunch

AI Playground

Teacher Panel

Lightning Talks

Break

Teacher Professional Development

Discussion

Adjourn

Plenary Session (Optional)

Saturday

Pedagogy

Ethics

Break

International AI Education Talks

International Lightning talks

Lunch

Interactive Activity

Informal AI Education

AI Tools

Break

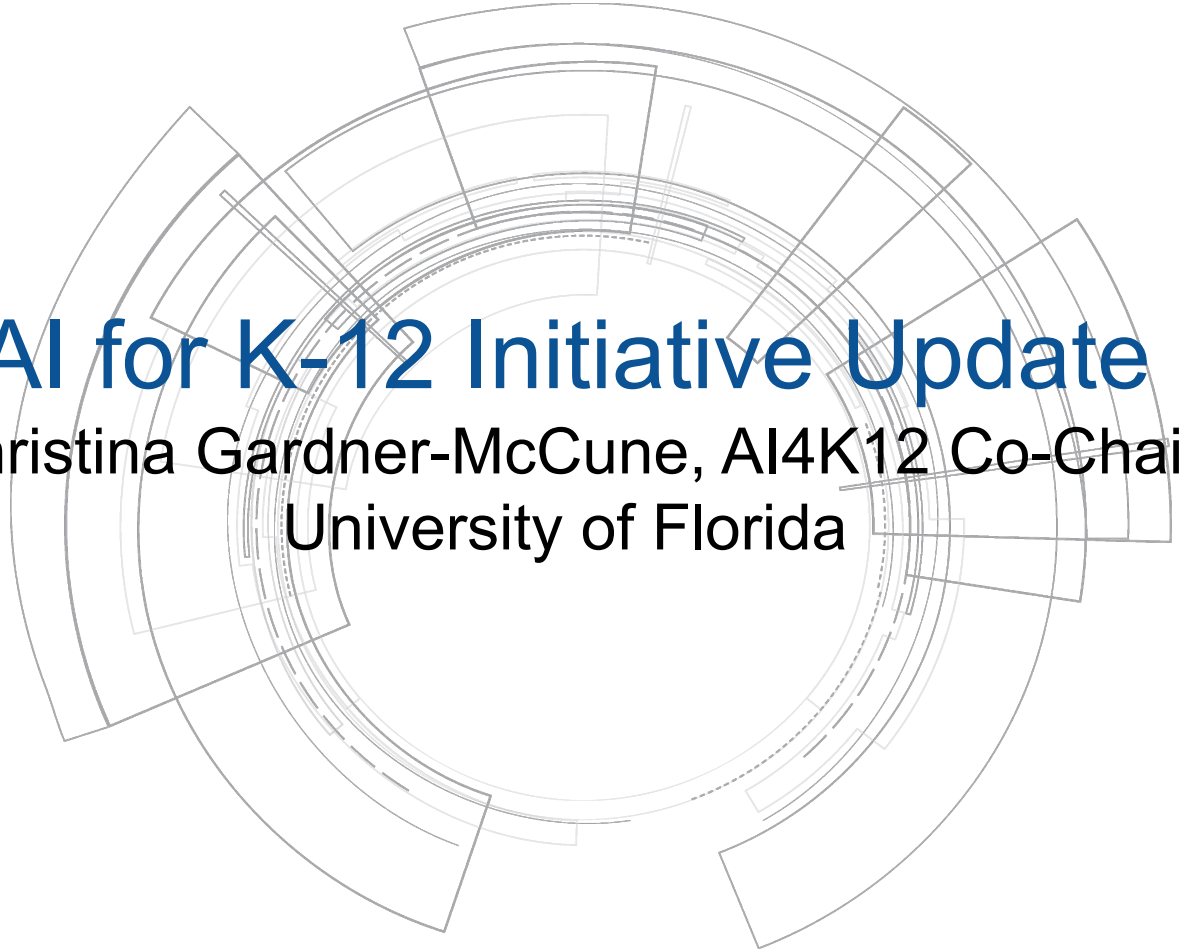
Closing Discussion

Adjourn

Opening Remarks

Chia Shen, NSF Program Officer

Division of Research on Learning in Formal and Informal Settings (DRL), ITEST



AI for K-12 Initiative Update

Christina Gardner-McCune, AI4K12 Co-Chair
University of Florida

Keynote Speaker

From Computational Thinking to Computational Action

Hal Abelson, MIT

Middle & High School AI Curricula, Part I

All means All: Bringing project-based, approachable AI curriculum to more high school students through AI4ALL Open Learning

Sarah Judd, AI4ALL

Data Science as a Route to AI for Middle and High School Students

Kathi Fisler, Brown University

An Interdisciplinary Approach to Bring AI into Existing Curriculum

Karon Weber and Anand Ankur, Microsoft

Will YouTube Pay Attention to Our Ideas?: AI + Ethics in Middle School

Blakely Payne, MIT

Coffee & Snack Break

Middle & High School AI Curricula, Part II

All means All: Bringing project-based, approachable AI curriculum to more high school students through AI4ALL Open Learning

Sarah Judd, AI4ALL

Data Science as a Route to AI for Middle and High School Students

Kathi Fisler, Brown University

An Interdisciplinary Approach to Bring AI into Existing Curriculum

Karon Weber and Anand Ankur, Microsoft

Will YouTube Pay Attention to Our Ideas?: AI + Ethics in Middle School

Blakely Payne, MIT

Lunch on Your Own
12:00 - 1:30pm

AI PLAYGROUND

Jupyter Notebooks for Teaching AI
Miles Berry, Roehampton University

AI+ME; AI-IN-A-BOX
Yang Cheng, ReadyAI

AI + Ethics Curriculum & Robot Construction Kits
Blakely Payne and Daniella DiPaola, MIT

ALPHAI Robot for Machine Learning
Thomas Deneux, Université Paris Sud

AI4All Open Learning Initiative
Sarah Judd, AI4All

Calypso for Cozmo
Dave Touretzky, Carnegie Mellon University and Visionary Machines LLC

Panel

Teacher Perspectives from the AI4K12 Working Group

pollev.com/fredm

Panelists

Vicky Sedgwick (lead, K–2)
K-8 Technology Teacher, St. Martin's Episcopal School, Winnetka, CA

April DeGennaro (K–2)
Teacher, Peeples Elementary, Atlanta, GA

Kelly Powers (lead, 3–5)
Teacher in Residence, Cornell Tech, New York, NY

Charlotte Dungan (6–8)
Instructor of Computer Science, North Carolina School of Science and Mathematics, Durham NC

Jared Amalong (lead, 9–12)
Computer Science Coordinator, Sacramento County Office of Education, Sacramento, CA

Moderator:
Fred Martin (steering committee)
Associate Dean, Kennedy College of Sciences, University of Massachusetts Lowell

Discussion questions

1. What cross-curricular opportunities to you see in bringing AI to your students?
2. What would you encourage us to think about to bringing AI to all students?
3. What is most exciting to you about teaching AI?

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Live Q&A

Raise your hand, or

Type a question here:
`pollev.com/fredm`

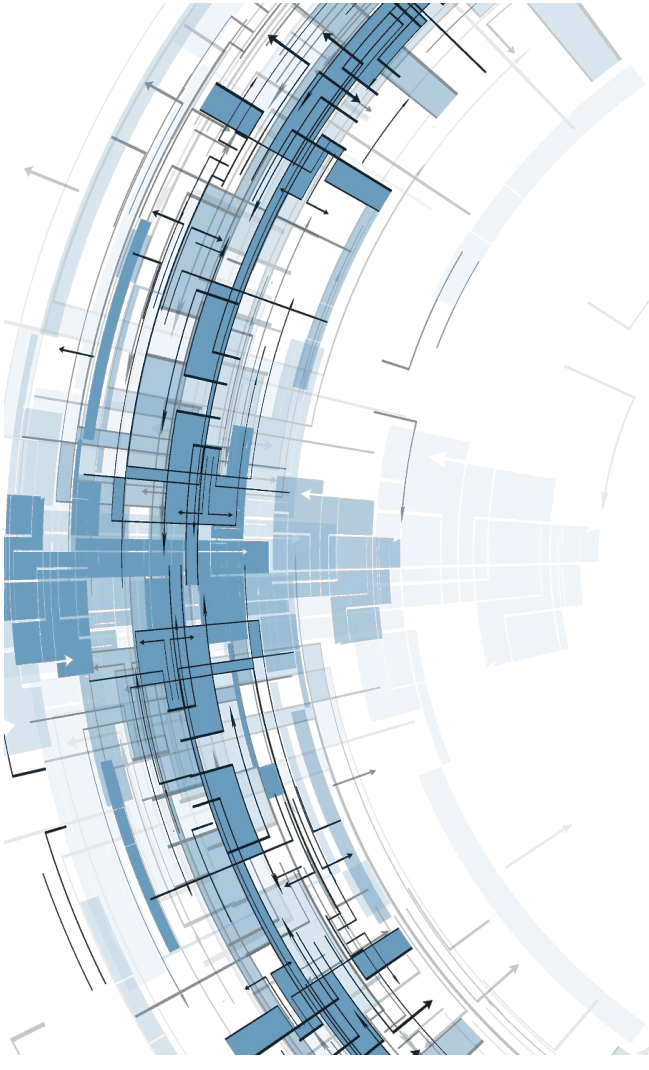
LIGHTNING TALKS

A High School Student's Perspective on Artificial Intelligence Education
Nicole Cheetham, Shenendehowa High School

Machine Learning Goes to High School
John Chapin, Academies of Loudoun

AI Books for Toddlers
Handeep Dhoot, Tinker Toddler Books

Barriers to Convergence with AI in K-12
Matthew Turner, University of Colorado Boulder



Coffee & Snack Break

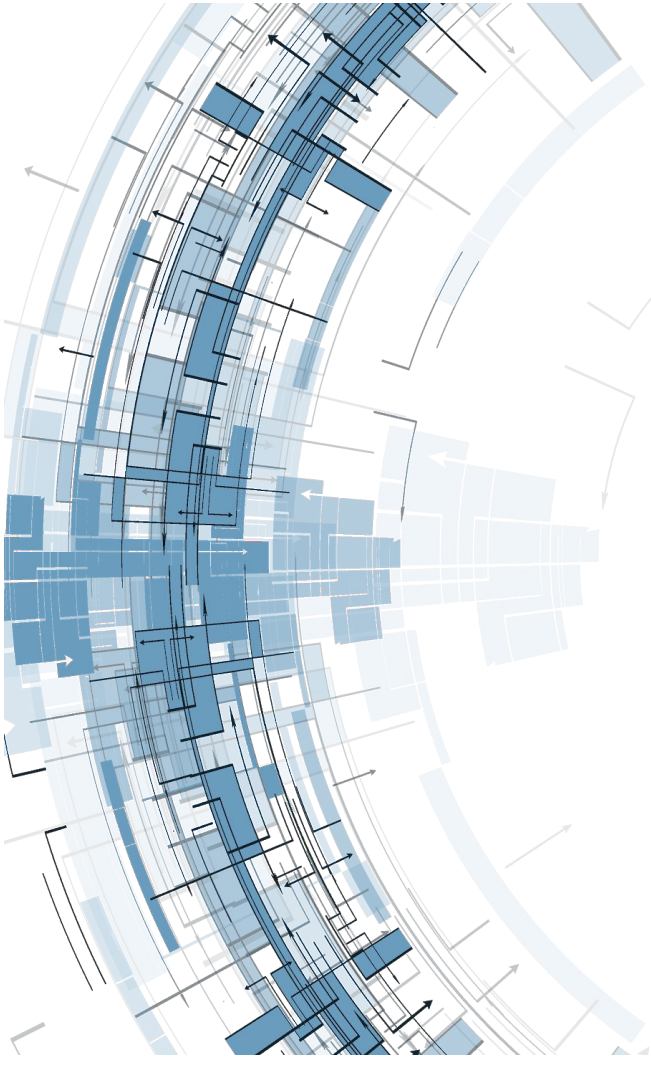
AI TEACHER PROFESSIONAL DEVELOPMENT

Empowering Educators to Teach Artificial Intelligence
Nancye Blair Black. ISTE

INSPIRE CS-AI: Innovative New Spaces for Practice and Rehearsal in Teacher Education in Computer Science with Artificial Intelligence
Justin Reich, MIT

K-12 AI Outreach in Higher Education: Pathways for Implementation
Elizabeth Taylor, Milwaukee School of Engineering

STEM-based AI Education in Professional Development for K-12 Teachers
Caitlin Quarrington, Actua



Discussion

Concluding discussion - Friday

Importance of integrating AI into other teaching

Oxford Dictionary vs Knowledge
AI & Ethics and Social Studies - Industrial revolution

Big Ideas in life - rather than adding and subtracting - what do they need to learn now? Think about how you would revamp everything.

AI can be a powerful way to talk about biology, hearts, and how humans define themselves and intelligence. Man thinking about his relationship to nature and now man and machine.

What AI says about being human? What do we need humans to do? Cooking...This is the next tool we will have that will be automated? Looking into the past and the future and what to do accordingly.

Range of developmentally appropriate. Huge literature on developmentally appropriate language. Glass box vs black box.
Action research so all can learn

AI is a terrible term. Tension - new way to make computers do things we want them to do. This is different than coding vs training. This is a great opportunity to help students see where they fit. We will have professionals in both. - See also Ben Shapiro article in CACM.

6:00 -7:00 pm

PLENARY SESSION

(OPTIONAL)

Speakers from
all 8 AAAI 2019 Fall symposia
will present brief (2-5 minutes) overviews of their key issues

Ning Wang
“Teaching AI in K-12” Symposium presenter

See you Tomorrow @ 9am

Keynote:

Building a Research Foundation for K-12 AI Education

Ning Wang, University of Southern California
James Lester, North Carolina State University

Teaching AI in K-12

2nd Annual AI for K-12 Symposium

AAAI 2019 Fall Symposium Series
November 9th, 2019

Announcements

Posters Hanging up for

- Ride-shares to the Airport
- Dinner this evening
- Thoughts
  - Big Take Aways from yesterday & today
  - Must Haves, Questions, or Concerns about the guidelines
  - Next Steps in the growth of the community

Archival Papers - Revise Extended Abstracts, Archive.org

- Deadline: 2 weeks
- Full Papers - 6-8 page
- Extended Abstracts - 2-4 pages

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Teacher Professional Development

Discussion

Adjourn

Plenary Session (Optional)

Saturday

Pedagogy

Ethics

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International AI Education Talks

International Lightning talks

Lunch

Interactive Activity

Informal AI Education

AI Tools

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Closing Discussion

Adjourn

Keynote:
Building a Research Foundation for K-12 AI Education

Ning Wang, University of Southern California
James Lester, North Carolina State University

Pedagogy

KEYNOTE: Building a Research Foundation for K-12 AI Education

Ning Wang, University of Southern California

James Lester, North Carolina State University

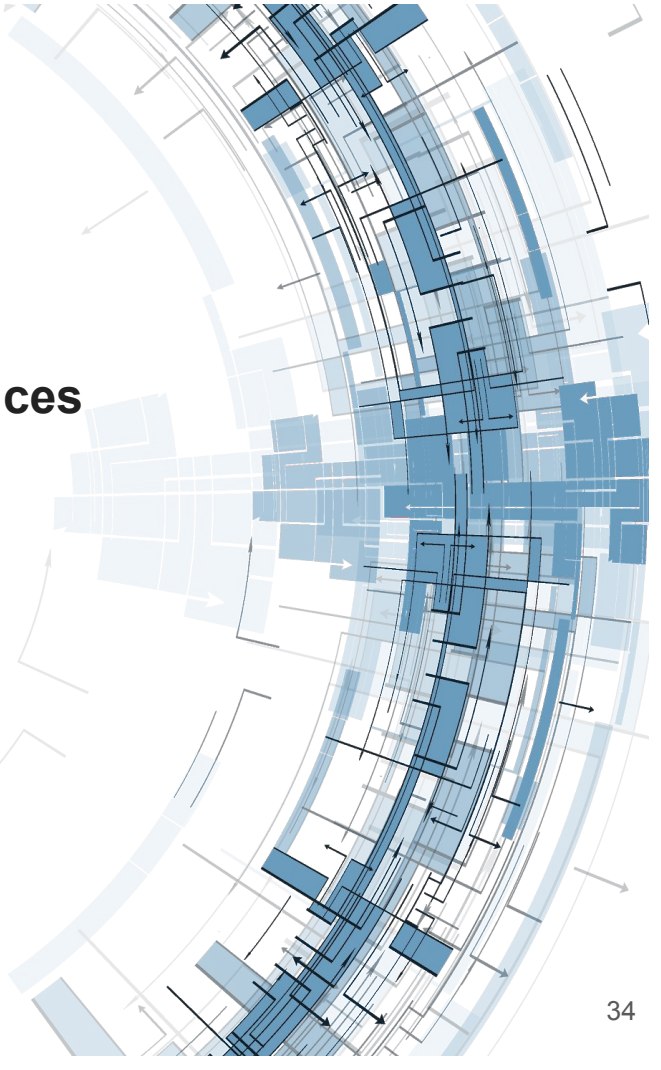
Computing in English Schools: Lessons to Learn for AI education

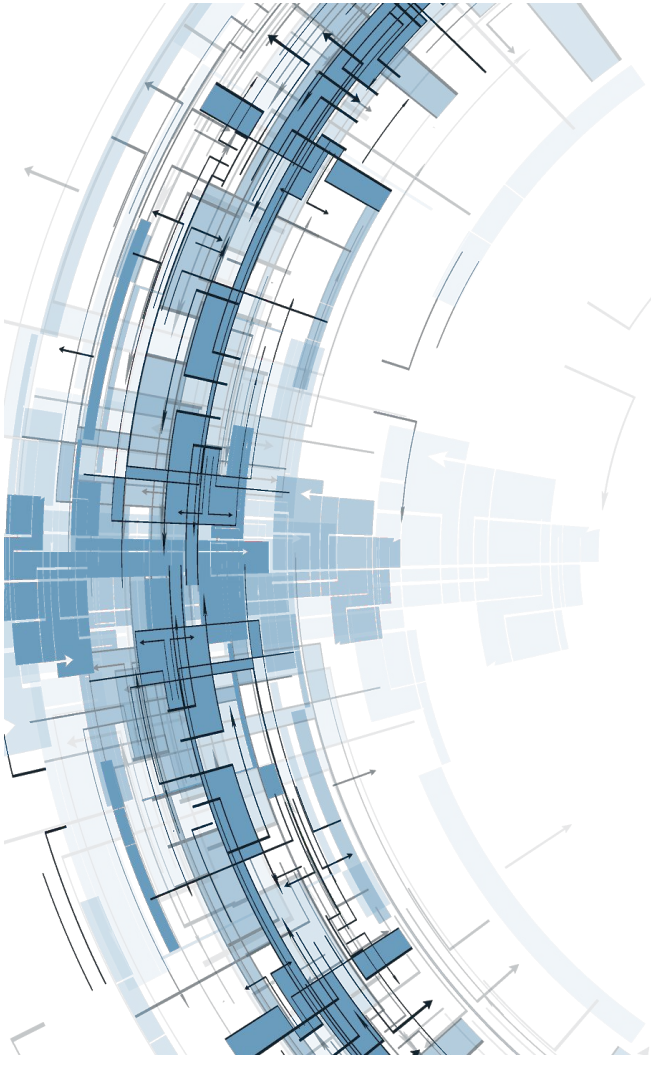
Miles Berry, Roehampton University

ETHICS

Integrating Ethics into K12 AI Learning Experiences

Tom Yeh, University of Colorado Boulder



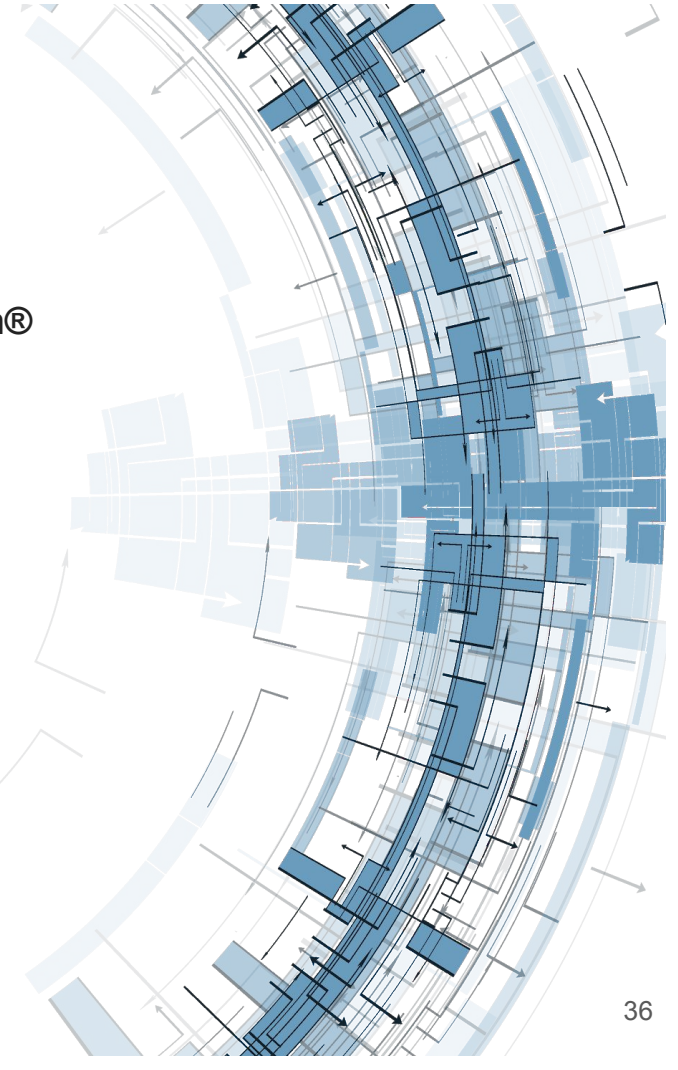


Coffee & Snack Break

International AI Education

Bringing AI to K-12 Education via Global STEM Classroom®
Larisa Schelkin, Global STEM Education Center

A Brief Comparative Review of
Multiple International Approaches to K-12 AI Education
Barnas Monteith, Tumblehome Learning



International Lightning Talks

CS in K-12
Burak Gencay, Bahcesehir University

Supporting AI Literacy Through Informal STEM Education
Caitlin Quarrington, Actua

Elements of AI: Teaching the Basics of AI to Everyone in Sweden
Fredrik Heintze, Linkoping University

European Driving License for Robots and Intelligent Systems

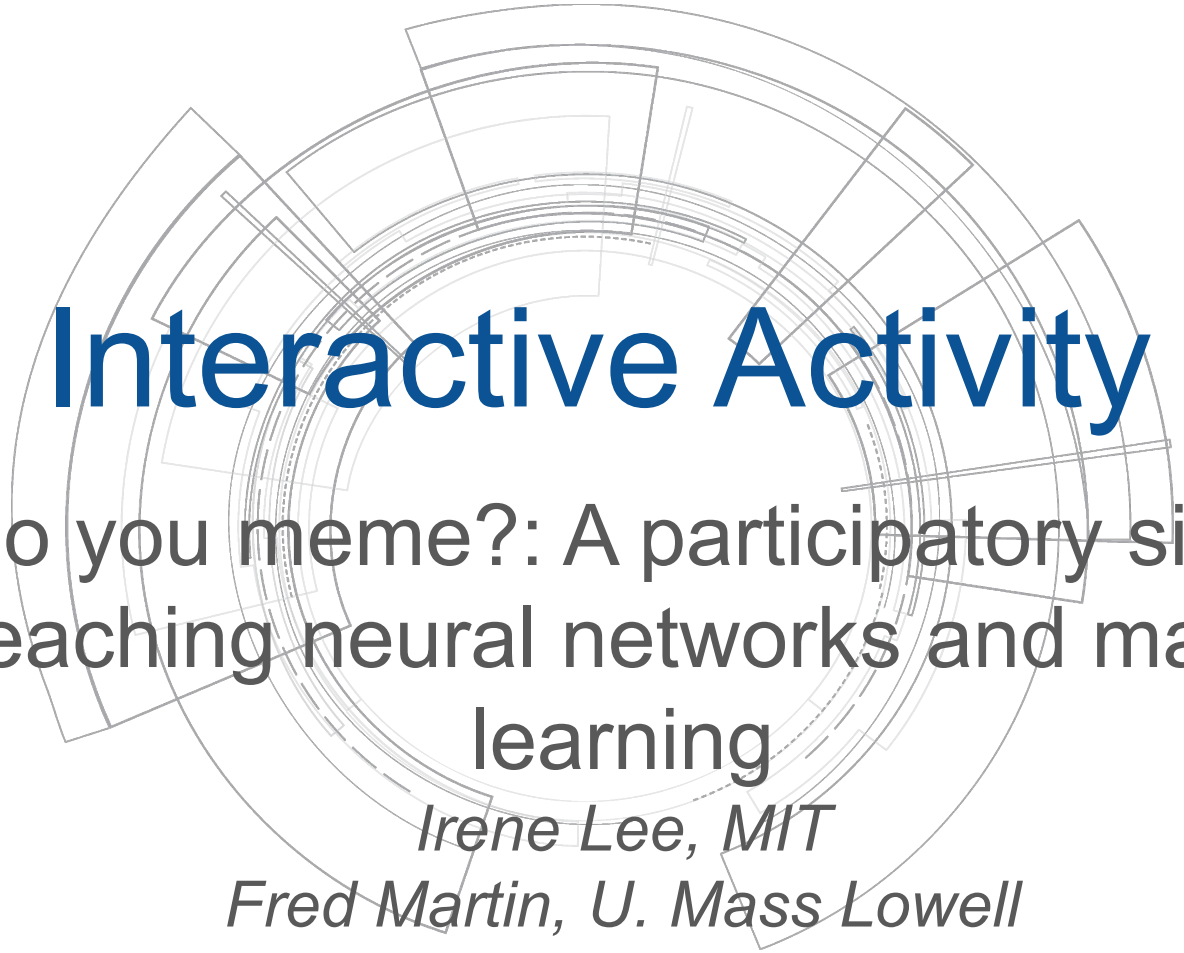
Martin Kandlhofer & Julia Lassnig, Graz University of Technology

Lunch on Your Own
12:00 - 1:30pm

After Lunch
Interactive Activity

What do you meme?:
A participatory simulation for teaching neural networks and machine learning

Irene Lee, MIT
Fred Martin, U. Mass Lowell



Interactive Activity

What do you meme?: A participatory simulation for teaching neural networks and machine learning

Irene Lee, MIT
Fred Martin, U. Mass Lowell

30 Minutes to Introduce AI to Kids

Claudio Pinhanez, IBM Research Brazil

Design and Implementation of AI Learning Cycles for AI Education in K-12

Elahe Javadi, Illinois State University

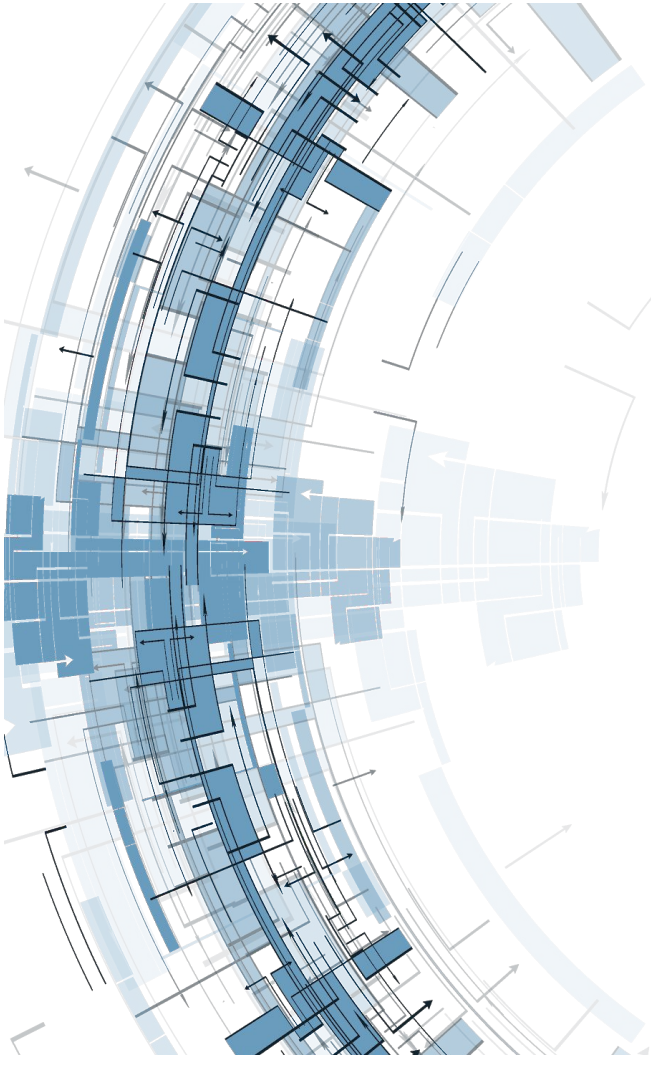
Teaching AI in K-12: ReadyAI's Workshop and WAICY as a Classroom Example

Yang Cheng, ReadyAI

Building Statewide Awareness of AI in K12 through District Planning and Teacher Outreach

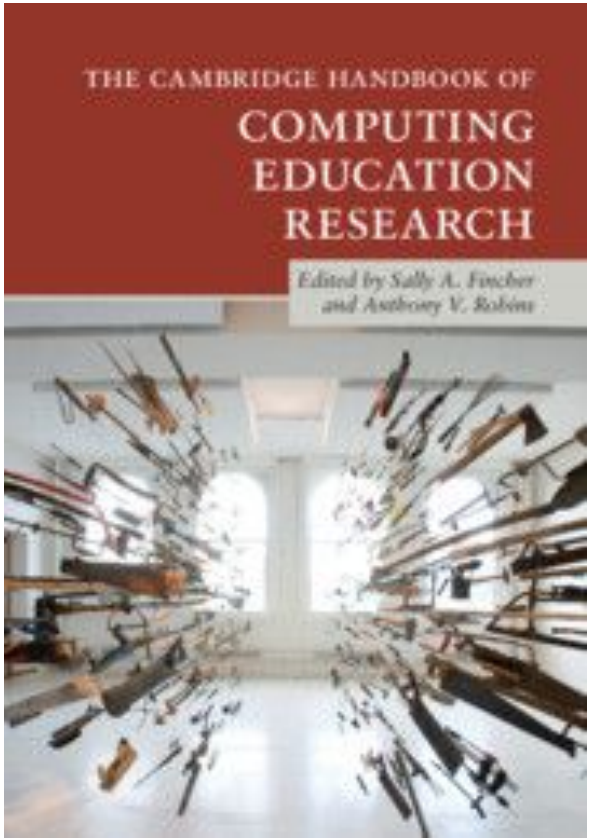
Dianne O'Grady-Cunniff, Maryland Center for Computing Education
Nora Blasko, Great Mills High School

Snack Break



Discussion

The Cambridge Handbook of Computing Education Research



Symposium Take-Aways

- Social good is a motivator for students
  - Especially when they can take computational action :-) +1
- Interdisciplinary approach is critical/needed
  - -> AI is social sciences, art, language etc

Guidelines: Must Haves

Guidelines: Questions & Concerns

What should we do next?

Next year

- Dedicated event for K-12
- Piggy-back after CSTA and make it AI specific
- Opportunity to do co-design and lessons together (Blakely)
    - 2-3 hour session
- Students present on projects
- Student created artifacts
- Project based work from symposium to symposia - make connection then target the product for the next symposium

Big next steps

- AI4k12 Mailing List - nice user interface for a community board to stay connected
- Elementary school was to integrate it into elementary school
- Neural network activity - how can we do this with other concepts - AI unplugged activities
    - Unplugged - hack-athon
- ISTE doesn’t have a professional learning network

Next Steps in the growth of the community

- Invite scholars from other disciplines- learning sciences, but also thos in social sciences, law, philosophy
- Bring math, social studies, english, stats, standards folks to the table, see how they can tuck the 5 ideas into their standards
  - AGREED! If we want interdisciplinary education, w need to integrate standards
- Needs to form “living” relations between the academic thinkers and the teachers, not just a relay, a circle.
- Need to explicitly reach out to arts education community
- Develop repository of AI for K-12 resources & effectiveness
  - Slack channel - to foster conversation
  - Curation is an issue -
  - Lesson Plans - created by teachers -
  - Curriculum will be ok because they have providers
  - Talk to Susan on working group - card navigation idea
  - Repository needs to connect back to the concepts at every lesson
  - LSM format - organized by the gradeband, standard alignment
  - Who is that target audience
    - non-CS teacher - integration for other disciplines (recruitment)
    - Standardized format - standards
  - Do we need another repository - maintaining and looking in multiple places
    - CSTA
    - ISTE
  - Not just lessons need high quality lessons - qty is not it
  - Publications? - higher ed
  - We don’t need an amazing repository to start
    - Allow teachers to upload and get feedback and story with the resources
- Industry for working together -> IBM corp citizenship level
- Identify common and systematic about misconceptions about Ai + remediation tactics

Next Steps in the growth of the community

- Need a 3rd party that puts things together - want more companies
- Repository
  - Focus less on sharing to the world
    - Closed community to find collaborators
- Community - to produce good collaboration and share

Guidelines

Format

- Super simple - hyperlinked website
- PDF
- Meets WC3 accessibility guidelines

Issues integrating AI into K-12 & For All

- Supporting teacher-led work when teachers are already undervalued and underpaid
- Curriculum/Standards Connections are non-linear, traditional alignment approach may not be ideal/appropriate
- Students should have a variety of datasets on which to train models as a way of surfacing divergent output/bias
- How will w tuck this into current curriculum? School curriculum/days are already busy
- How to create a “waterfall” regularly moving ideas “downward” to earliest stag possible and do it effectively.
- Research on best practices for special populations: autism, ECC, SOcial/Emotional disabilities minorities .. how to best reach **ALL** populations wiht researched strategies
- Connect AI in K12 with AI for K-12
    - Exposure to and adoption at the classroom level of CSC tools can lay groundwork for teachers adoption as learning topics
- Who is currently funding AIED work and who should fund it?

There is ENERGY here to drive thriving innovation clasters?.

A phenomena that we always hope you see, but I’ve never had the chance to be part of before.