Panel Presentation
- Role of Computing for Precision Medicine

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Integrated Clustering for Cancer
Mutated Clusters (Expression Data Only)

- 4 Grade 4, 29 Not Grade 4
- 1 Grade 4, 6 Not Grade 4

Mutated Survival, Hier. Clust. Cutoff = 1.6

- 1 Grade 4, 6 Not Grade 4
- 4 Grade 4, 29 Not Grade 4

\[ p = 0.93 \]
Mutated Clusters (Methylation Data Only)

- 2 Grade 4, 22 Not Grade 4
- 3 Grade 4, 13 Not Grade 4

Survival probability over time with different clusters and strata.
Mutated Clusters, Integrated

Mutated Survival, Hier. Clust. Cutoff = 1.9

Strata: cluster=C1, cluster=C2

2 Grade 4, 19 Not Grade 4

3 Grade 4, 16 Not Grade 4

p = 0.078
Anil Parwani

Quantifying WSI Classification Uncertainty

Ground Truth
UA-DNN (Baseline)
UA-DNN (Disease-relevant tiles)
High confidence tiles

Grade 1
Grade 2
Grade 3
Single Cell, Multiplexed Imaging
http://icicle.ai
NSF-Funded AI Institute

Dhabaleswar K. (DK) Panda (OSU)
Raghu Machiraju (OSU)
Eric Fosler-Lussier (OSU)
Vipin Chaudhary (Case)
Beth Plale (Indiana)
Vision

A national infrastructure that enables artificial intelligence from anywhere: ICICLE has the potential to transform today’s AI landscape from a narrow set of privileged disciplines to one where democratized AI empowers domains broadly through integrated plug-and-play AI.

Converging under one virtual roof, ICICLE will foster and advance communities: catalyzing foundational AI and CI and transforming application domains.

ICICLE will enable a transparent and trustworthy national infrastructure for an AI-enabled future, addressing pressing societal problems. ICICLE will grow new generations of workforce.
ICI: Computational Learning in the Environment

Driving Use Cases from Smart Foodsheds, Animal Ecology, and Digital Agriculture

- Systems provide a continuum of field-to-edge-to-cloud/HPC centers
- Provide very large, complex, heterogeneous data for a plethora of scientific and operational questions
- Targeted domains are not well supported by AI-CI
- ICICLE will augment current cloud-based AI models by:
  - Facilitating decision-making in the field plagued by low network bandwidth
  - Allowing data to be private but facilitating collaborative intelligence
  - Provisioning models to use and plan computation and data movement
An Overview of ICICLE

- Plug-and-play characteristics exists in current generation electricity and power grid
- No such plug-and-play AI exists for modern scenarios
- Can we democratize AI in these modern scenarios?
- How do we assemble computational and human resources needed to build next generation CIs (ca. 2030) capable of supporting AI across diverse use cases?
- Democratizing AI will require new Cyberinfrastructure that enables:
  - Plug-and-play AI capabilities that are accessible to diverse stakeholders
  - Intelligent Cyberinfrastructure – CI4AI & AI for CI4AI
  - Advances in foundational AI that support
    - Model commons
    - Conversational AI
    - Privacy-preserving AI
    - Adaptive AI
  - Use-inspired research for co-design in select target domains
- Inclusive growth of next generation of AI-capable workforce trained in transdisciplinary settings
SmartAutomation
Reproducibility Crisis in Experimental (Wet) Laboratory

- 70% researchers can’t reproduce experiments.
  - Expensive: $28B/year.
  - Automation is key - However, current systems are flawed
    - Not general purpose enough
    - Requires manual programming
  - Need general-purpose end-to-end intelligent automation system.
Isolation of temperate phages by plaque agar overlay

1. Grow the bacteria overnight.
2. Melt soft agar overlay tubes in boiling water.
3. Boil in the 47°C water bath by not disturbing for 30 min.
4. Remove one tube of soft agar from the water bath.
5. Add 1.0 mL host culture and either 1.0 or 0.1 mL viral concentrate.
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Thank You for Listening!