ARTIFICIAL INTELLIGENCE OPPORTUNITIES AND CHALLENGES IN HIGHER EDUCATION

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Opportunities for Higher Education

What has Artificial Intelligence done for Higher Education?

What has Higher Education done for Artificial Intelligence?

What does Higher Education need to do to prepare our students for this new world?
What has AI done for Higher Education?

Changed the dynamics of services offered

• Admissions Review
  • Enhancing the Admissions Process

• Virtual Assistants
  • AdmitHub (Georgia State) Chatbot for Q&A about admissions
  • USC – ICT – AR/VR Teaching Assistants, Orientation, …

• Facilities Management
  • Scheduling, Monitoring, HVAC Optimization
What has AI done for Higher Education?

Changed the way we think about educating students

- Intelligent tutoring systems (ITS)
- Smart Content
- Virtual Facilitators and Learning Environments
- Expanded Classroom and Personalized Learning
What has AI done for Higher Education?

Raised concerns over its widespread use, personal & technological

- Privacy
  - Exploiting Student Movement
  - Using Tracking or Recognition

Private information leakage [7,8]: Image extracted via queries to a facial recognition algorithm (left) vs. the enrolled image (right).
What has AI done for Higher Education?

Raised concerns over its widespread use, personal & technological

- Privacy
- Security
  - Lifetimes of Data
  - Decision Systems

Deep Learning Models (VGG)
100+ Million Parameters

“Panda”

“Gibbon”

(Goodfellow, 2014)
What has AI done for Higher Education?

Raised concerns over its widespread use, personal & technological

• Privacy

• Security

• Ethics and Bias
  • Admissions
  • Grading

Biased results [1]: Sentencing algorithms 2x as likely to predict black defendants as repeat offenders.
What has Higher Education done for AI?

- A key player in Fundamental Research
- Provided baseline AI education for some students (STEM)
- Provided a test bed for problems that won't be addressed in industry
- Provided a resource for the job market – but can we keep up?
What are the biggest concerns about AI?

Computers will reach a level of consciousness and take over? **NO**

- Terminators Skynet?

- Computers will learn from the data we give them, and enhance our current processes
What are the biggest concerns about AI?

Loss of entire industries putting most of the population out work? **NO**

- Not a new concern
  - 1900s – 98% of Textiles were automated… no more jobs
  - 1970s – ATMs were introduced…. no more tellers

- McKinsey estimates that AI will EVENTUALLY automate 30% of tasks in 60% of jobs

- Job skills will shift…
What are the biggest concerns about AI?

We don’t feel prepared for the future?  **YES**

• Northeastern-Gallup survey
  • 22% of current workers with bachelor’s degrees or higher think their own education has prepared them to work with AI.
  • 43% are confident they can obtain the education they’ll need.

• This is something that we can address
What can Higher Ed do for our Students?

- Help them understand the Fundamentals of ARTIFICIAL Intelligence
  - Privacy, Security, Bias and Ethical Concerns
  - Take CS (Type) courses to understand the basis for tech
What can Higher Ed do for our Students?

• Help them understand the Fundamentals of ARTIFICIAL Intelligence

• Mentor Every Learner – Fill in the Gaps
What can Higher Ed do for our Students?

- Help them understand the Fundamentals of ARTIFICIAL Intelligence
- Mentor Every Learner – Fill in the Gaps
- Universal access to global classrooms
What can Higher Ed do for our Students?

• Help them understand the Fundamentals of ARTIFICIAL Intelligence
• Mentor Every Learner – Fill in the Gaps
• Universal access to global classrooms
• Provide Life Long Learning
  • We just cant keep up with everything
  • New degrees will be a set of credentials
World is Demanding AI...

• DARPA is investing $2 Billion for NextGen AI

• Companies already spending & Hiring students with any AI background

Universities are Responding...

• CMU start the first AI Degree Program

• MIT will invest $1B in a new school of AI

Lets Embrace the Opportunity, but be informed
Augmenting Human Intelligence through Partnerships with Machines

- Life Sciences/Medicine
- Computer Science
- Human Intelligence
- Humanities
- Physical Sciences
- Engineering

- Precision Healthcare
- Smart Cities
- Ethics, Bias
- Artificial Intelligence
- Security
- AI Education
- Materials
Goals of Institute

• advance **disciplinary core** of AI in the understanding of humans and machines,

• identify **cross-cutting applications** in other disciplines to co-evolve AI while solving domain-specific challenges,

• study **social and cultural implications** and assume leadership in formulation of **policies for ethical and legal considerations**, 

• design **innovative educational programs and skills training mechanisms** to prepare students and retool the workforce for the AI era, 

• develop **strategic partnerships with industry and government**, and 

• evolve **training ecosystems for workforce development** to cultivate the skills and capabilities necessary for the AI driven future.
AI Thrust Areas

- Autonomy and Robotics
- Health and Medicine
- Intelligent Space
- Legal and Ethics
- Advanced Materials
- AI Fundamentals
- Advanced Research Computing
- AI Education and Outreach
The Evolution of Healthcare

Key Areas of Synergy
- Evolution of evidence base for precision medicine and implementation science
- Recognition of underuse and overuse of interventions
- Management of abundance of data

Optimal use of genomics and behavioral data to drive clinical and patient decision making
- Ongoing development of genomics evidence base
- Personalized and population impact

Optimal integration of effective diagnosis, prevention, and treatment
- Understanding of multilevel context
- Theories and strategies to drive health care improvement

Key Areas of Synergy
- Support for implementation of effective practices
- Contextually sensitive improvement of practices

Improved health, health care, and health systems

Key Areas of Synergy
- Refresh cycle of evidence base
- Determination of degree of achievable personalization of care

Use of ongoing data to drive health system improvement
- Focus on iterative and ongoing learning
- All stakeholders participate
Structure for Outdoor Autonomy Research (SOAR)

- A massive netted facility will have a footprint of 300' x 200' x 60'
- A mobile command center vehicle to enable off-site research,
- A 3-D printer to be installed within the mobile command center,
- Additional unmanned aerial and ground vehicles to complement our existing fleets, and
- Sensors, cameras, and communications

Autonomy Research

- The Olli Bus NYSERDA/NYSDOT Project
- Living Transportation Lab
- NSF MRI Project (iCAVE2)
NSF MRI Project (*iCAVE*²)

Building the one-of-the-kind federated VR platform for Connected and Autonomous Vehicles Evaluation and Experimentation

$1.2m$ funding from NSF + 550K matching from UB

The vision is to establish a national testing and certification center
Augmenting Human Intelligence through Partnerships with Machines