



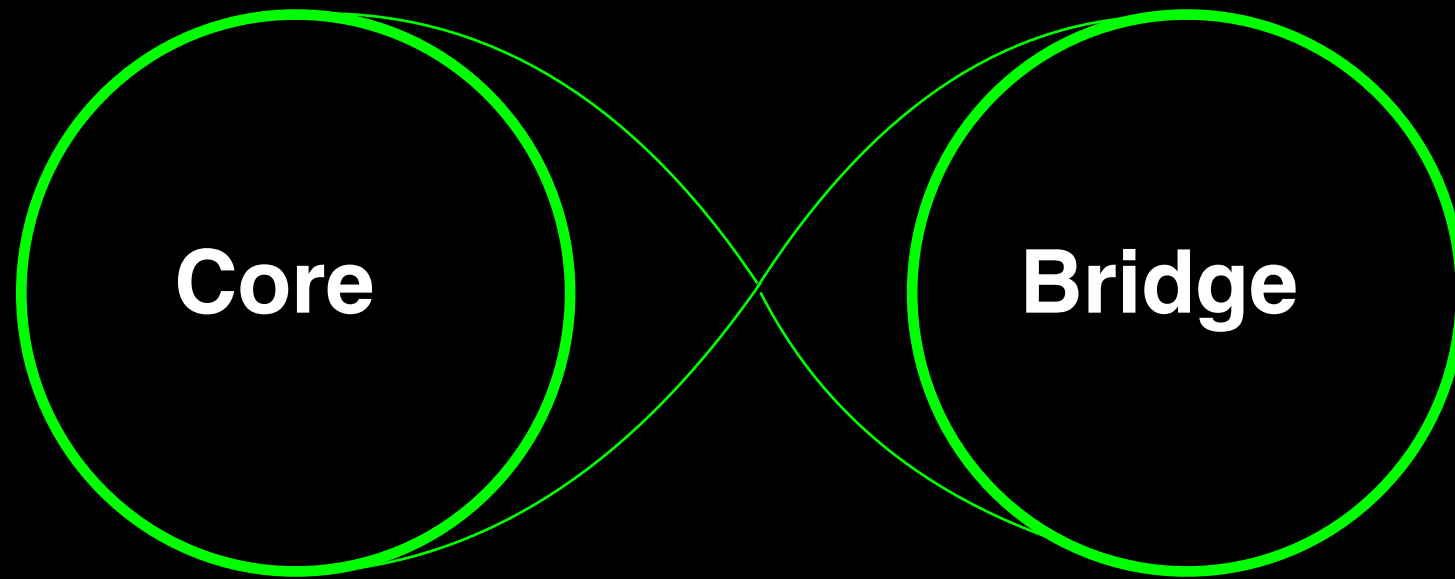
The Quest for Intelligence

Aude Oliva | Executive Director, MIT Quest for Intelligence

What is the MIT Quest for Intelligence?

- The Quest aims to advance two fundamental intelligence challenges:
- Can we reverse engineer intelligence?
- How can we deploy our current and expanding understanding of intelligence to the benefit of society?

The Core and the Bridge



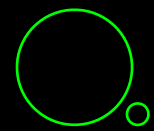
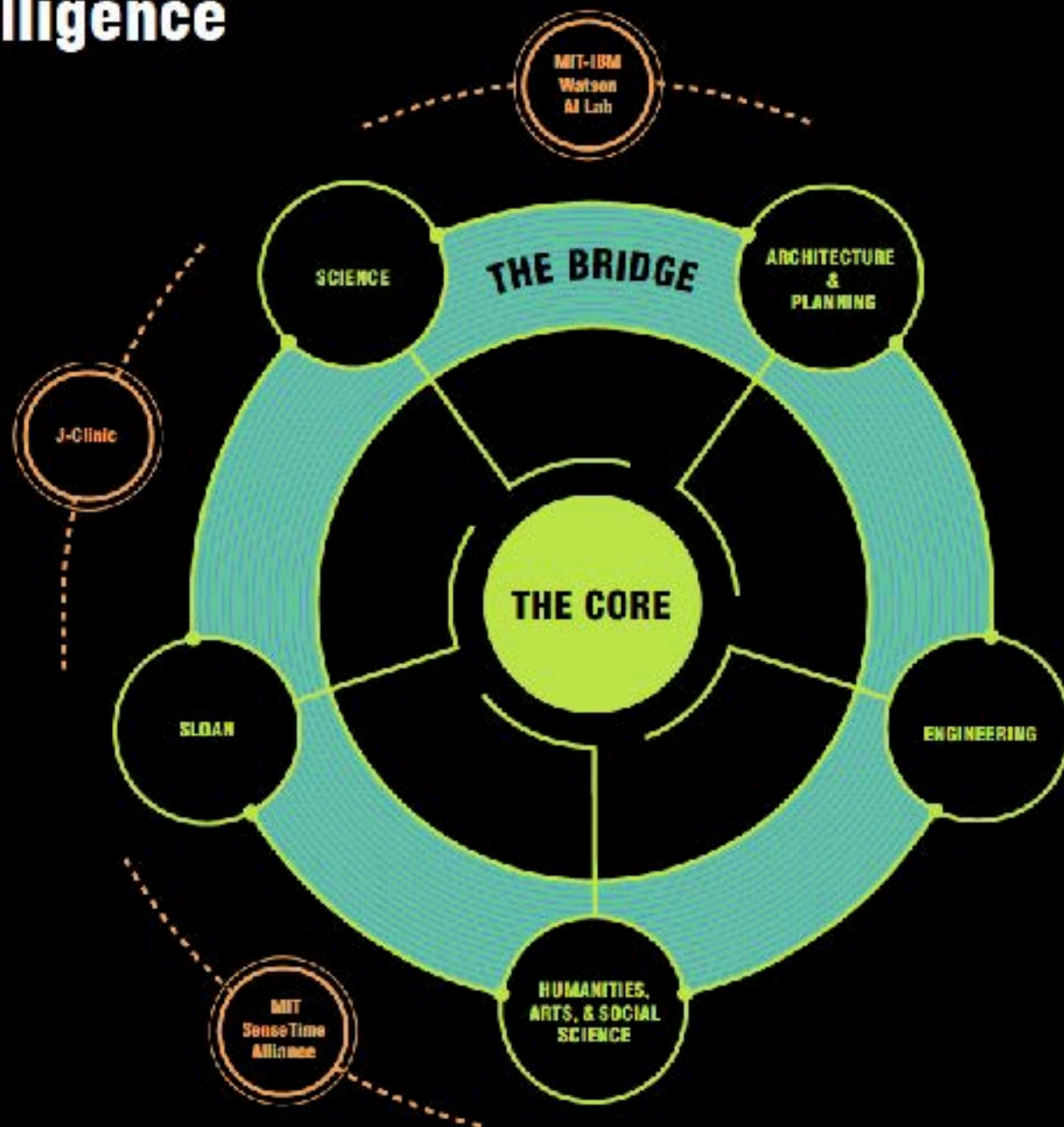
The Core: Advance the science and engineering of intelligence

-> cognitive science, biology, physics based machine-learning algorithms and insights

The Bridge: Implement the newest intelligence techniques

-> Provide people inside and outside MIT with intelligence technologies, tools, platforms, and infrastructure (data sets, technical support, specialized software and hardware)

MIT Quest for Intelligence





College of Computing



**Architecture
&
Planning**

**Humanities
Arts
&
Social
Sciences**

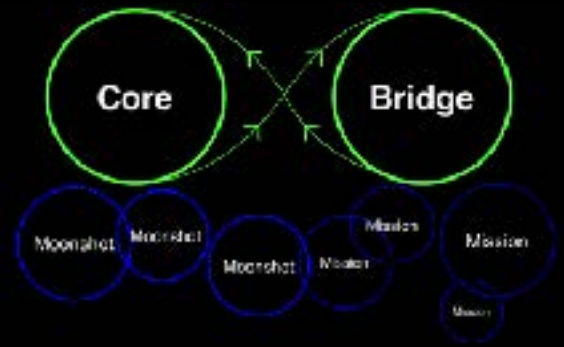
Engineering

Science

**Sloan
School
of
Management**

Quest Moonshots & Missions

- Team-driven bet on a large, unsolved problem in intelligence
 - Projects go above and beyond business as usual
 - Projects that MIT is well positioned to lead
-



The Development of AI

Narrow AI

Big data
Pattern analysis
Single task
Offline decision

Emerging AI

Multi-tasks
Online prediction
Intelligence at the edge
Reinforcement learning
Transferability
Replicability
Parallelism

Human-level AI

Cognitive Flexibility
Continuous learning
Common sense
Intuition
Ethical overlay
Adaptability
Collaboration
Theory of Mind

1980

2012

We are entering Emerging AI



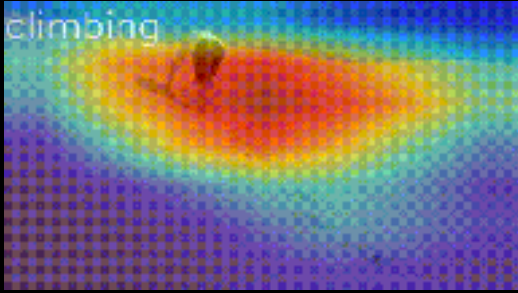
handwriting



Visual Intelligence

Visual systems with **common sense reasoning**

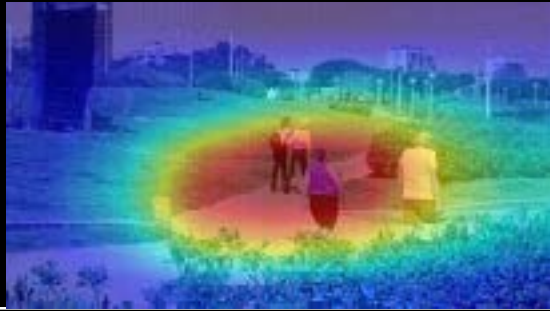
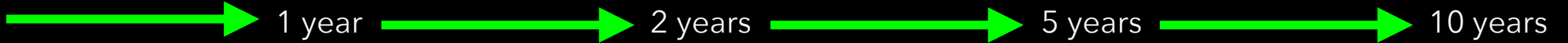
54 % Classification



Abstraction: "separate"



Common
sense



Recognition



Intention & Causality

Visual Intelligence

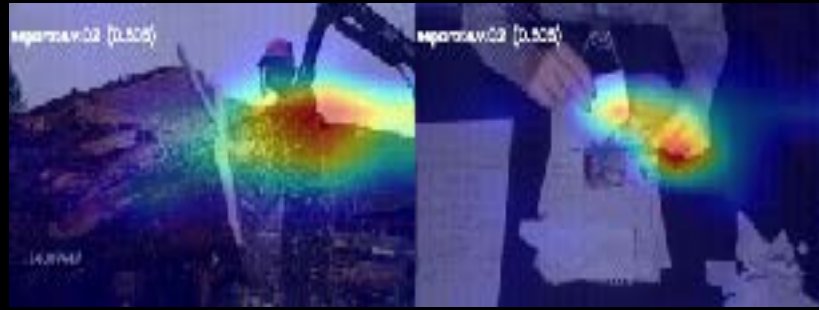
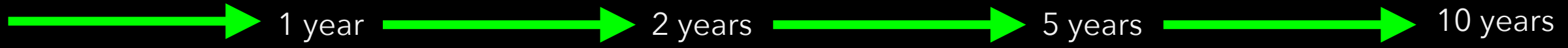
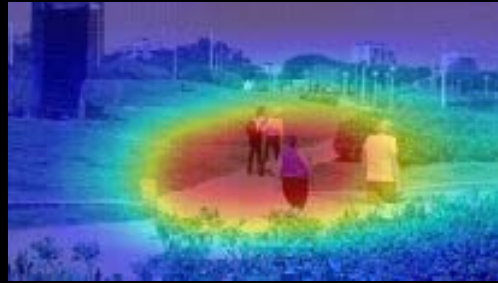
Visual systems with **common sense reasoning**

71 % Recognition

Intention & Causality

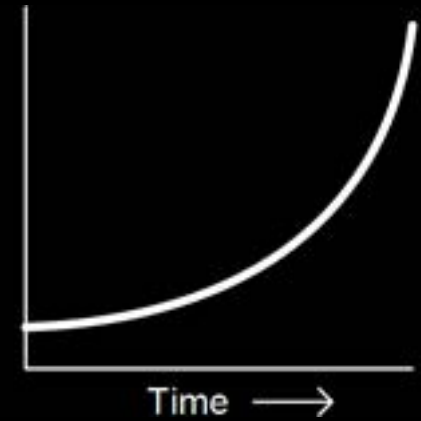
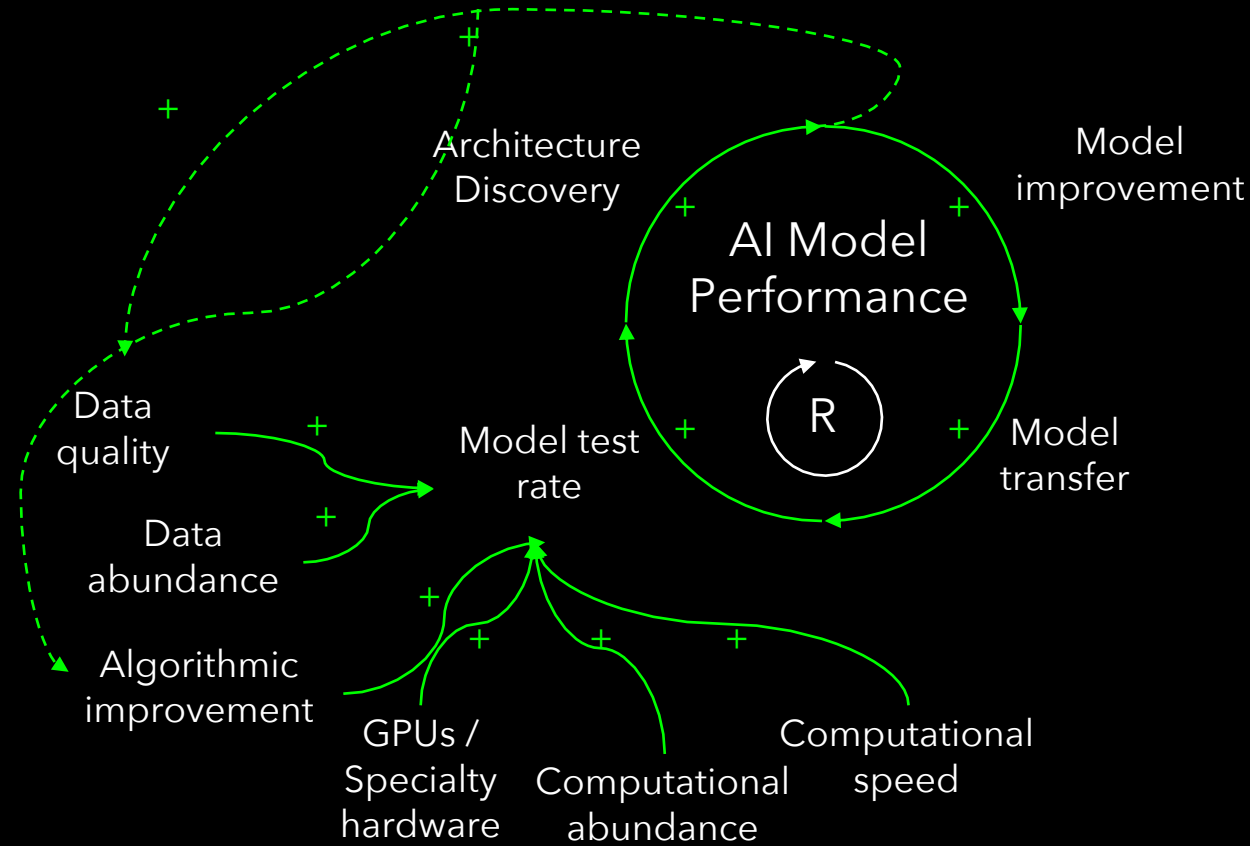
Common sense

Theory of Mind



Abstraction: "separate"

Promoters to AI success



Trustworthy and Robust AI

Systems which decisions are **transparent, interpretable and explainable**



Model Response: washing dishes
Correct label: brushing



Unit 1679
Bathroom

Unit 867
Kitchen

Unit 1749
House

Unit 795
Bathroom

Unit 1978
Person





Multi-sensory AI: Wireless signals as sensors

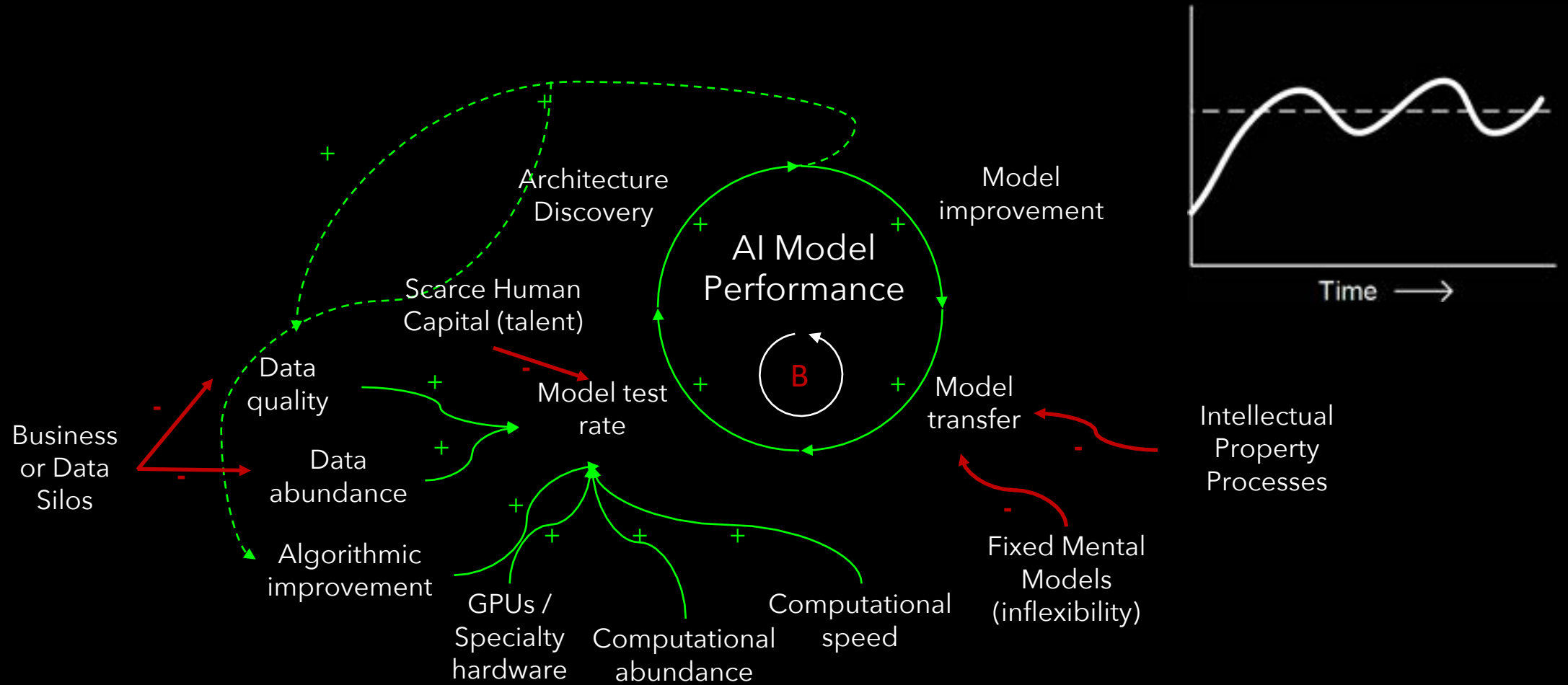


Current Issues and Challenges in AI

- Lack of accessibility
- Lack of resources
- Lack of expertise in tools
- Lack of reproducibility



Promoters and Barriers to AI success





Software



- Open repository
- Standardized
- Reproducible
- Deployable
- AI workflows
- AI pipelines

People



- Consulting Team
& Ethical Team
- Academic
- Industry
- Developers
- Users

Data



- Curation
- Hosting
- Archiving
- Benchmarks
- Research datasets

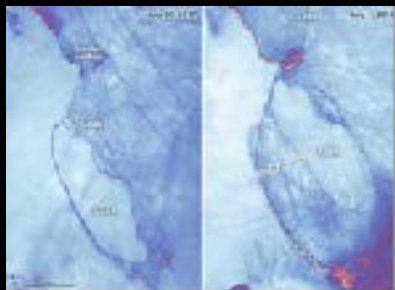
Hardware



- Seamless
- AI development
- Industry clouds
- Local clusters
- New Hardware

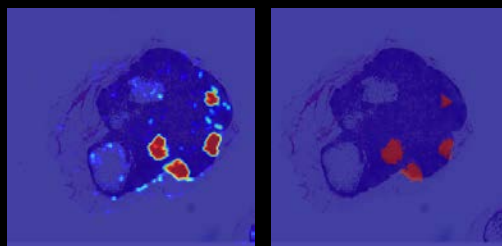
The AI Workflow: Documentation, Executable, Ethical Use Bridge

Classification



Iceberg states from satellites to monitor environment

Localization



AI Human

Localization of Lesions

Detection



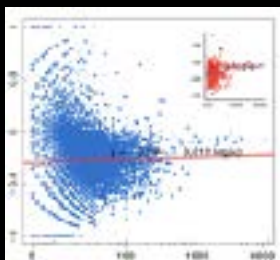
Detection of outliers, anomalies (cyber threat detection)

Forecasting



Forecasting financial risks, demands

Regression



Sentiment quantification from news to evaluate polarization

Recommendation



Recommendation engines

Reinforcement Learning



Control optimization for facilities

Ranking



Identifying disease genes from gene expression data

Discovery



Exposure to emerging trends, technologies and talent in intelligence

Exploratory



Multiply the impact of Discovery membership with research

Visionary



Exponentially expand Exploratory membership with a long-term research vision

Quest Leadership Team

- quest.mit.edu



Antonio Torralba
Director, Quest



Erik Vogan
Director of Corporate
engagement



Aude Oliva
Executive Director
Quest



Daniela Rus
Associate Director Core



Cynthia Breazeal
Associate Director Bridge



Leslie Kaelbling
Scientific Director



Josh Tenenbaum
Scientific Director



James DiCarlo
Director, Quest Core



Ignacio Fuentes
Managing Director
Chief Operations Officer



Nick Roy
Director, Quest Bridge



Josh Joseph
Chief Intelligence Architect



Tomaso Poggio
Scientific Advisor