AFRL/AFOSR & ACT3
Autonomy in Research FY24

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TechNet Emergence

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Program Strategy Awareness

Revolutionizing USAF/USSF Capabilities – Artificial Intelligence (AI)

"You don't understand anything until you learn it more than one way"
-- Prof Marvin Minsky MIT

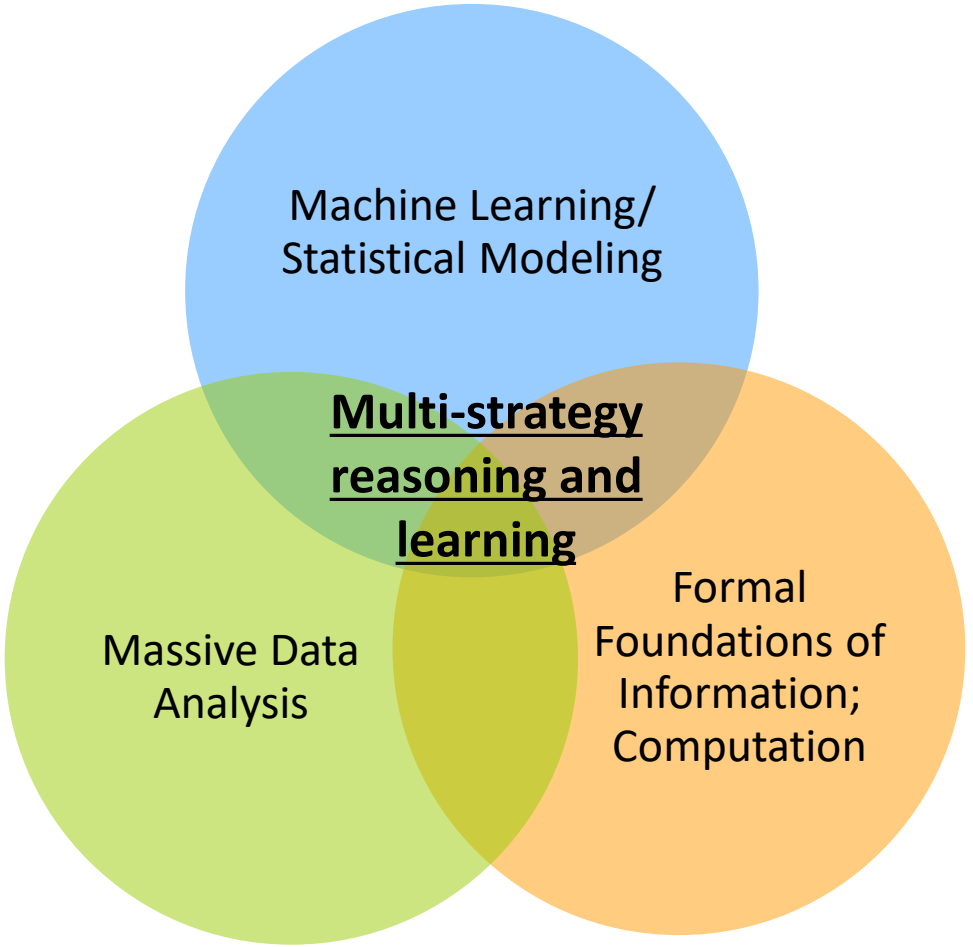
- analytics and learning techniques that formulate <u>multiple perspectives;</u>
  - **<u>explain</u>** perspectives, recommendations and options
  - not just "derivative AI", but expanding the science of "AI"

Overview

OBJECTIVE:
This program seeks to advance the science of machine learning and reasoning in terms relevant to the USAF/USSF

RESEARCH AREAS :

- **machine learning**
- **analytics**
- **formal foundations**



Integration of a diversity of numerous reasoning and learning "machines"

TEAM --- Awards/Recognition

ACM Turing Awards
IJCAI Research Excellence Award
Benjamin Franklin Medals
IEEE Frank Rosenblatt Award
ACM AAAI Allen Newell Award
MIT Killian Award
Bocher Prize
Kampé de Fériet Award
MIT MacVicar Award
Fields Medal
Rank Prize
Kolmogorov Medals
IEEE Neural Networks Pioneer Awards
AAAI Feigenbaum Prize
Wolf Prize in Math
Salem Prize
Prize NEC/C&C Foundation
J. S. McDonnell Complexity Science Scholar Award
Japan Prize
Robert Wood Prize for Optoelectronics
IEEE John von Neumann Medals
BBVA Foundation Frontiers of Knowledge Award
Chevalier de la Legion d' Honneur
Bergman Prize
Alan T. Waterman Award Paris Kanellakis Award
IJCAI Computers and Thought Awards

Vannevar Bush Faculty Fellow
Sloan Research Fellowship
Warren D. White Award
PECASE Presidential Early Career Award for Scientists and Engineers
International Quantum Communication Award
MacArthur Fellow
ONR Young Investigator Awards
IEEE Aerospace and Electronic Systems
Forbes Magazine 30 Under 30 Rising Stars in Science
IEEE PAMI Distinguished Researcher Award
NSF Presidential Young Investigator Award
NSF Career Awards

Member American Philosophical Society
Members American Academy of Arts and Science
Members National Academy of Inventors
Members National Academy of Engineering
Member Argentine National Academy of Sciences
IEEE Fellows
ACM Fellows
AAAI Fellows
AAAS Fellows
American Physical Society Fellow

- Industry Start-up: Conexus AI Corp enabled from work in categorization theory leading to innovations in databases
- New inventions: frame-based systems, support vector machines (SVMs), neural net-back propagation, deep learning-convolutional neural net, confocal microscope, never ending learning, perceptrons…

Program Strategy

Revolutionizing USAF/USSF Capabilities – Machine Intelligence

- **<u>lead with the finest scientist</u>**
  Fox, Lecun, Tenenbaum, Vapnik, Fefferman, Baraniuk, Maggioni, Selman, Gomes, Spivak, Papandreou, Li…
- **<u>get out of the box</u> – dramatic theories**
  England, Minsky-Winston-Davis, Mitchell, Lloyd, Fragkiadaki, Cap-Rogers…
- **<u>collaboration</u> within the programs**
- **next:**
  - **mixed-initiative interaction**
  - **autonomous systems that learn with**
  - **biophysics of memory and learning**
  - **novel computational platforms**

IMPACT --- USAF/USSF