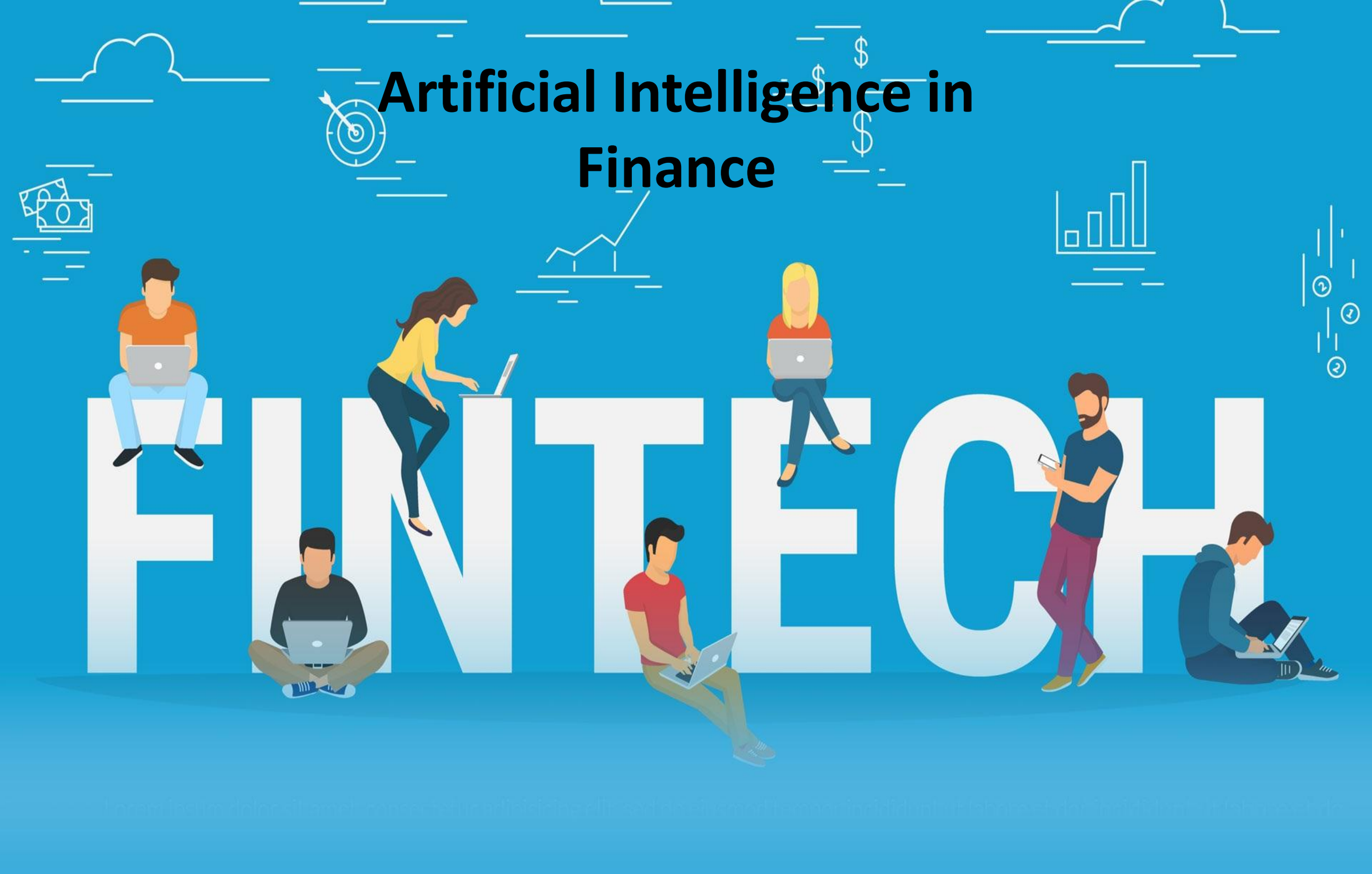
Artificial Intelligence in Finance



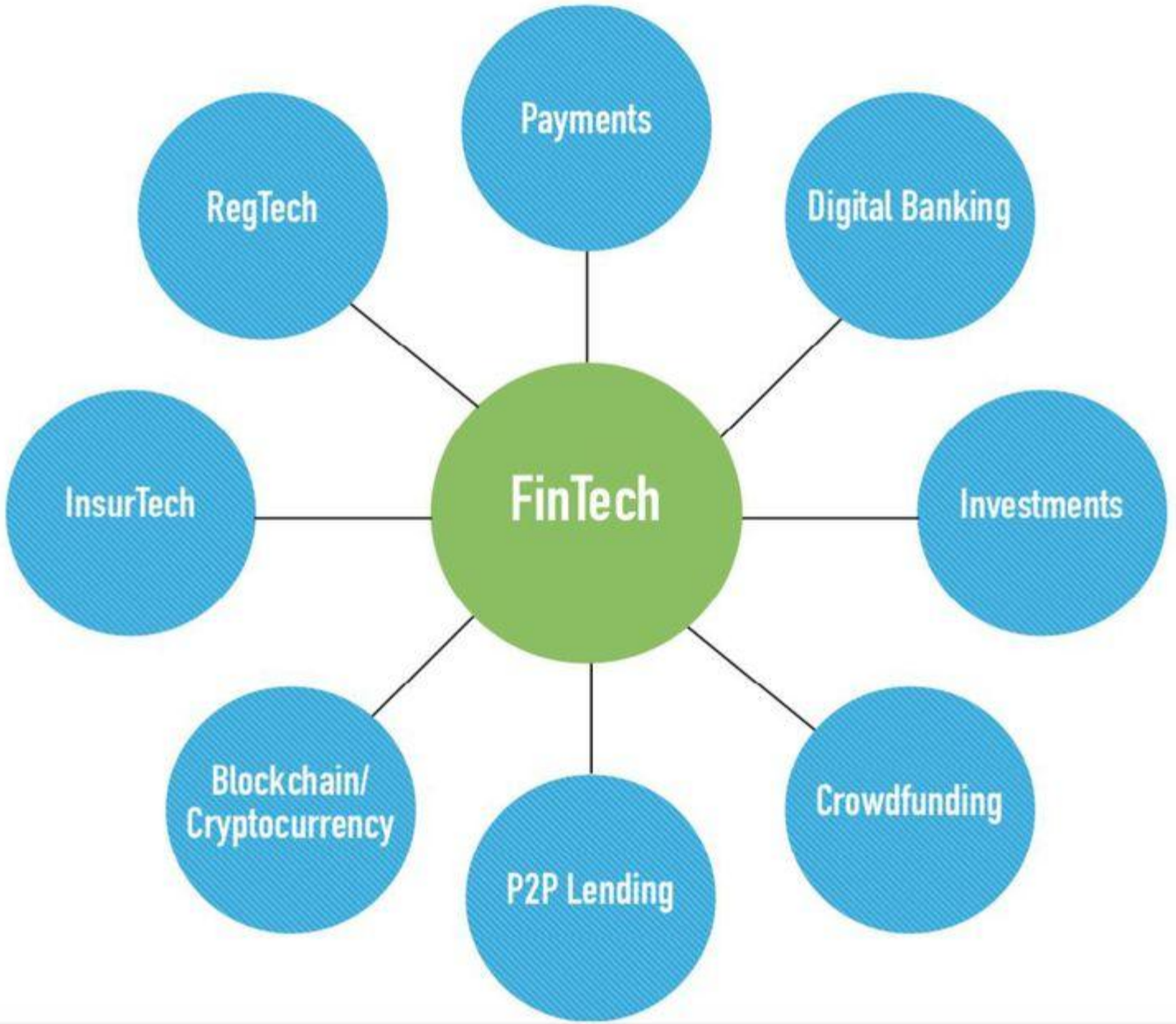
Content

- Finance Technology Stack
- AI & Machine Learning – Finance
- Finance Public Policy Framework
- AI Policy & Finance

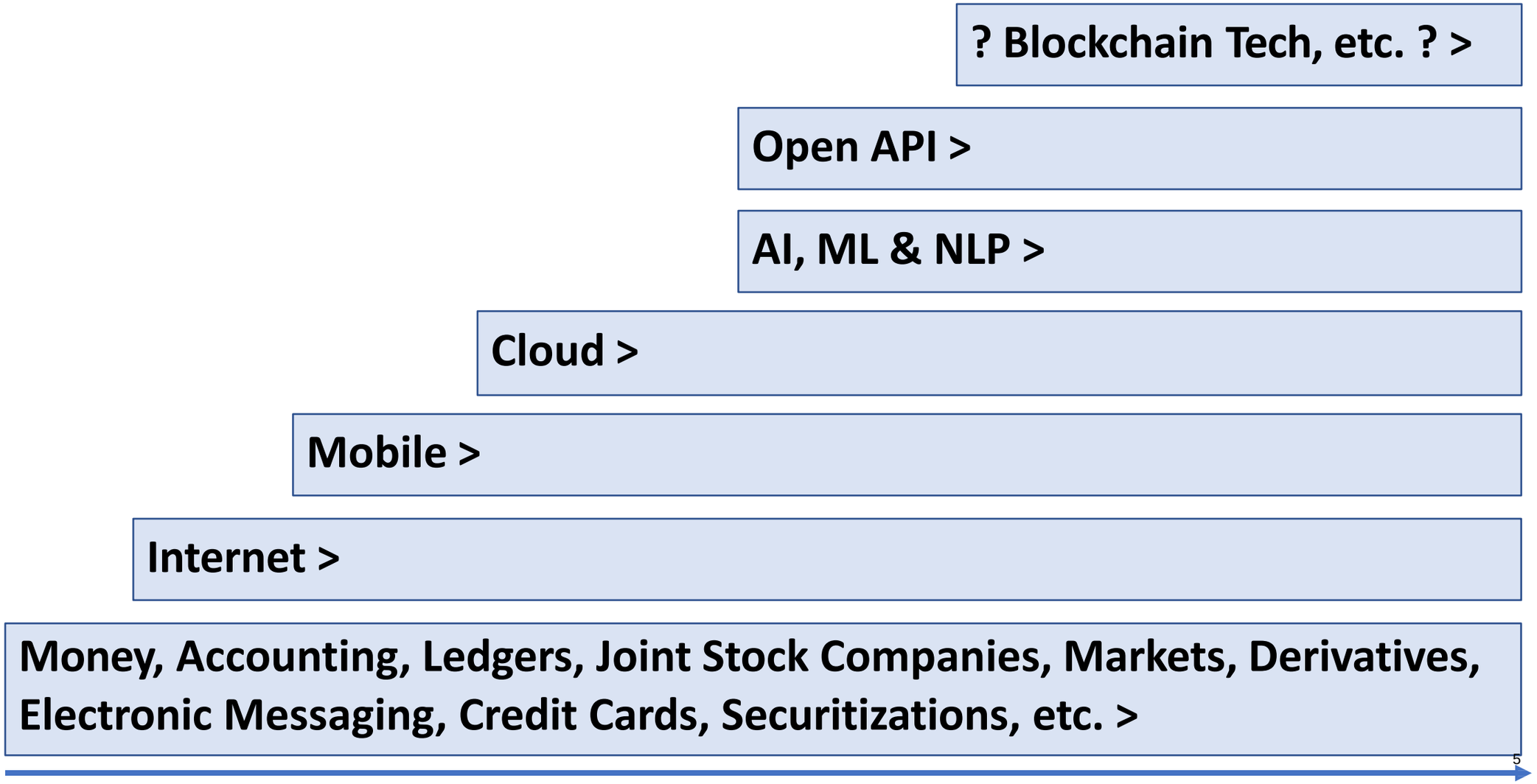
What is FinTech?

Financial technologies that create new or improved financial services for both consumers and businesses. It includes everything from personal financial management tools, insurance, payments, asset management, credit, savings, back- end financial platforms, compliance, blockchain solutions, etc.

FinTech Universe



Finance Technology Stack[3]



AI and Machine Learning [2]

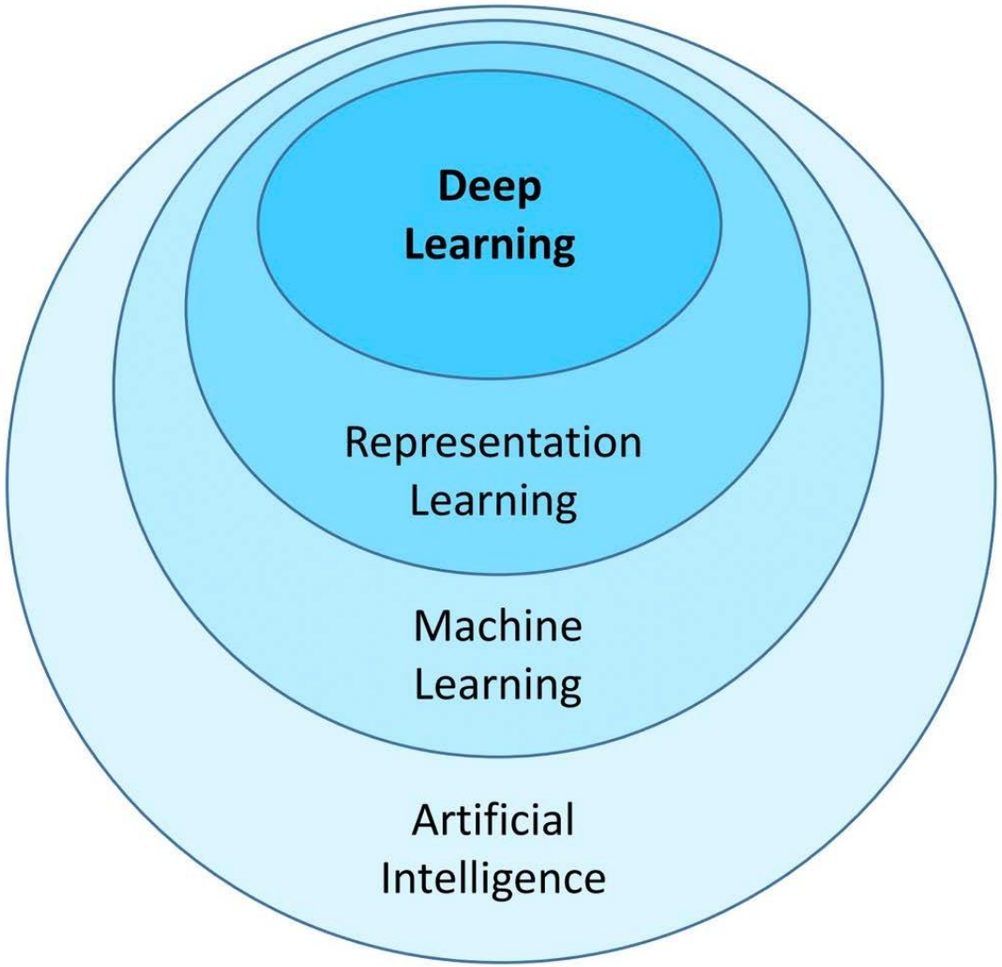


Image by Lex Fridman..

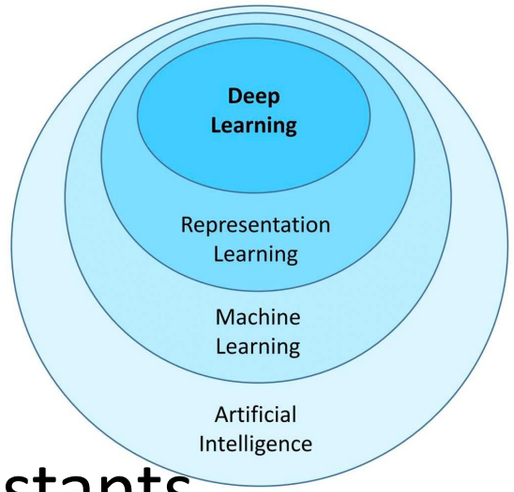
DL - => 2010's => ML with Multi-layer Neural Networks

RL – ML Extracting Features of Data Sets

ML – 1980's => Machines Improve with Experience

AI – 1950's => Computers Mimic Human Intelligence

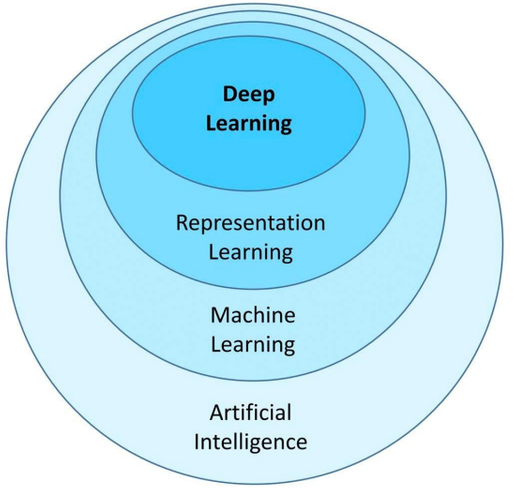
AI and Machine Learning – Finance [2]



- Asset Management
- Call Centers, Chatbots, Robo-Advising & Virtual Assistants
- Credit & Insurance - Allocation, Extension, Pricing & Scoring
- Fraud Detection & Prevention
- Regulatory – Anti Money Laundering, Anti Manipulation
- Risk Management & Underwriting
- Robotic Process Automation
- Trading

Image by Lex Fridman.

AI and Machine Learning – Finance [2]



- **AI as a Tool**
  - Big Finance, Big Tech, & FinTech Disrupters
- **AI as a Service**
  - AlphaSense (2011) – Search Engine
  - Cape Analytics (2014) – Insurance Property Risk Analytics
  - ComplyAdvantage (2014) – Anti-Money laundering & KYC Software
  - Dataminr (2009) - Market Sentiment Analysis
  - Featurespace (2008) – Anti-fraud Software
  - HyperScience (2014) – Document Processing
  - Tractable (2014) – Insurance Claims Processing
  - Zest AI (2009) – Credit Underwriting Software
  - Zesty.ai (2015) – P & C Insurance Risk Analytics

Image by Lex Fridman.

AI and Machine Learning – Finance

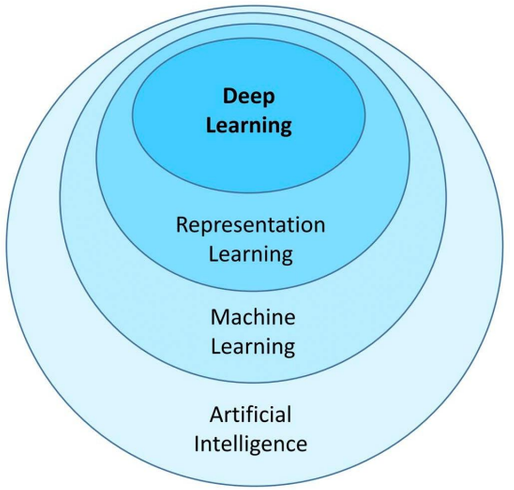


Image by Lex Fridman

- **Credit Karma (2007)**
  - Free Credit Report Platform
  - $7.1B Merger announced with Intuit (February 2020)
  - Nearly $1B 2019 Revenues;
  - 106M members; 37M Monthly Active Members; 2600+ data points per member; 8 Billion Daily Model Predictions
- **Plaid (2013)**
  - Open API Software & Data Aggregator
  - $5.3B Merger announced with Visa (January 2020)
  - Estimated $109M Revenues
  - 200+ Million Accounts Linked; 11,000 Financial Cos; 2,600 FinTech Developers

Sources: 'Intuit Acquisition of Credit Karma' Intuit (2/24/20); 'Visa's Acquisition of Plaid', Visa (1/13/20); & 'What's Visa Going To Do With Plaid?', Forbes (1/20/20) for Plaid Rev. Est.

Finance Public Policy Framework [1]

- Money & Lending
- Financial Stability
- Protecting the Consumer & Investing Public
- Guarding Against Illicit Activity

AI Policy and Finance [1]

- Biases, Fairness, and Inclusion
- Explainability, Transparency, and Auditability
- Privacy and Data Ownership

- Use of Alternative Data
- Algorithmic Correlation or Collusion ?=> Interconnectedness
- Resiliency vs. Fragility
- Risk Management and Oversight

- How AI & ML Fits within Current Regulatory Frameworks
- Principles & Guidelines generally at High level & Non-Binding

Technical landscape (and forecasting)

Can we foresee potentially transformative capabilities? What are the technical inputs, possibilities, and constraints that involved in the development of advanced AI?

- What is advanced AI going to look like?
  - Tool AI/comprehensive services?
  - Agent-like AGI? Maximizer?
- Narrow AI capability development ordering
    - Pro-coordination (Communication, translation, negotiation, structured transparency)
    - Anti-coordination (Cyber-weapons, misinformation/propaganda)
- The role of hardware v. algorithmic advancements?
- Sample of current research projects:
  - Miles Brundage of FHI does some work on prediction, especially with atari games.

AI Politics [1]

What are and likely will be the political dynamics between firms, governments, publics, researchers, and other actors, and how will these be shaped by and shape the technical landscape.

- Political landscape research: Who are the relevant powers in this space, what are their goals and incentives, and what can they control?
  - This is a place where policy-type research expertise
  - Important for sensible recommendations and finding tractable approaches.
- Grand strategy - Broad approaches forward:
  - Decentralized coordination through verification, international agreements, cooperation enhancing technical trajectories
  - “Snowball” centralized development and deployment through appealing values, incentivization, coalition building

AI Politics [2]

- Security and stability
  - Policy levers for great power peace:
    - Even a small risk of WWIII warrants great attention and avoidance since it is terrible in its own right, including potential x-risk.)
  - Potential risk of an AI tech races becoming an “arms races” through large military involvement
    - Exacerbates race dynamic + accident risk
    - Might threaten beneficial deployment
  - Volatility in balance of power might be destabilizing
    - (Technical and power differentials have been dangerous historically….)
- Avoiding/spinning down race dynamics
  - Increase accident risk
    - Riskier approach

AI Politics [3]

Small sample of current AI politics research projects:

- Public opinion and the public as relevant political actor (multiple surveys)
- Case studies: cryptography, space race, nuclear fusion, intergovernmental research projects, satellite technology, etc.
- China's AI landscape and opportunities for coordination
- Balance of power and offensive/defensive capabilities
- Unipolar versus multipolar outcomes
- "Grand strategy" plans
- Tech race mitigation (through modeling)
- (and many more…)

AI Governance

What potential global governance systems, including norms, policies, laws, processes, and institutions, can best ensure the beneficial development and use of advanced AI systems?

- Institutional, constitutional, and procedural design of an AI governance body (or bodies)
  - For quality and for viability
- How to incentivize creation of an AI governance regime or organization
- Mechanisms for increased cooperation and coordination
- Sample of current research projects:
  - Governance research agenda overview
  - Case studies: Baruch plan and related, CERN, ITER, ISA, etc.
  - AI verification and international agreements

(How I think about) AI Policy (*controversial*) [1]

What are the concrete legal, policy, and political approaches which can be used to most effectively implement a robust AI strategy?

1. (I believe) we are bottlenecked at the level of AI strategy research, and accordingly:
    a. There are **not yet much concrete AI policy research that can be done towards policy implementation** without a better sense of specific strategic direction.
    b. There are not many robust or concrete policy recommendations that we can currently make. (*This point is especially controversial, again treat it with skepticism.*)
        i. Avoid tech races and cooperate
        ii. Invest in safety research
        iii. Commit to some form of the "common good principle"

(I wrote a post on EA forum ["Personal thoughts on careers in AI policy and strategy"] covering this in more detail. For those interested in this I would encourage you to look it up.)

How I think of AI Policy (*controversial*) [1]

2. There is policy-type expertise that can feed into AI strategy research, but mostly in the form of "landscape research."
3. Without a clear strategic vision, (I believe) making concrete policy recommendations is unwise:
    a. Hard to reverse course (path dependency, "unpassing" a law, credibility, difficulty in spinning down a rivalry or a race, etc.)
    b. Normal heuristics seem to fail (openness, surveillance, centralized political power, etc.)

(I wrote a post on EA forum ["Personal thoughts on careers in AI policy and strategy"] covering this in

Deeper dive: “IGO for Common Good” [***VERY*** *Preliminary*] [1]

Setup:

1. IGO research organization (like CERN or ITER), running a AI research laboratory.
2. Funded by many nations, ideally including the US, China, Russia, India, and the EU.
3. Located in a relatively geo-politically neutral and/or trusted nation.
    a. Two potentially good candidate locations: Montreal or near Geneva.
4. Committed to the common good principle (ideally formulated mostly in economic terms).
5. International governing body constrained by “common good” constitution, but with flexible procedure and ability to expand.

Primary functions:

1) It is a credible signal of commitment by participating states to an economically-centered common good principle.
2) Reifying and instilling the common good principle as a norm.
3) Serving as a focal point for international cooperation (including potential iterated tech race deescalation.)

Deeper dive: “IGO for Common Good” [***VERY*** *Preliminary*] [2]

What I like about this idea:

- Could start soon.
- Does not require much course divergence, serves as an additional module to other plans.
  - Does not require states to give up national champions or firms to leave the space, at least not in the near term.
- Even if it fails, it probably breaks elegantly, having helped instill norm
- Could serve as a location for an iterated deescalation of an AI tech race
- Harness economic fears towards a positive end (race inducement harnessed towards race decreasing end)
- If it served as a centre for a single global project, it might be a “research first” way to force the issue of greater global coordination, including on sensitive strategic matters (analogous to the Baruch plan).

Deeper dive: “IGO for Common Good” [***VERY*** *Preliminary*] [3]

Possible problems/weaknesses:

- Would leak, which might exacerbate race dynamics in some models
- Might go wrong if implementation is not properly motivated:
  - A poor effort fills the space a later better effort might have
  - Could be captured by parochial or ideological interests detrimental to functions
- Might cause 3 way race, which might be worse (?)
- Doesn’t solve any problems at all. At best it is a module that provides some minor assistance to a different, more comprehensive, strategic plan.
- More?

Next actions for the interested (potentially controversial)

- Operations: (***Urgent and immediate***)
  - Junior positions - Good for orientation and tooling up (**probably should not be treated as an immediate step to research**)
  - Senior positions - For experienced managers and administrators.
- [Related] Community organizers and communicators (potentially voluntary)
- Strategy researchers: (Urgent and immediate)
    - ***Need to be very independent and self-directed.***
  - Disentanglers
  - Subject matter experts (list of especially in-demand subject available with my EA forum post, and also on the internship advertisement on the FHI website.)
- Policy researchers: (Low immediate demand, very high value in expectation.)
  - Tool up and place yourself well.
  - Skills similar to above - the two categories are a bit blurry.
- Policy implementers:
  - Tool up and place yourself well.
  - Network, stay involved in the community, be ready for a big push. [52 minutes]

FinTech - Policy Alternatives [3]

- Technology Neutrality
- New Activities Come within Existing Frameworks & Laws
- Clarification where Application of Rules are Ambiguous

- Legal and Regulatory Requirements Adjusted:
  - For New Activities … or Technologies
  - For Existing Activities
- Regulatory Perimeters Moved

- Promote Early Stage Activity … or Technologies (e.g. Sandboxes)
- Promote via Open Banking & Competition Policy

Alternative Data

- Bank, Checking, Employment, Income, Insurance, Tenant, Utilities
- Cash Flow Underwriting
- Consumption and Purchase Transactional Data
- App Usage, Browsing History, Email Receipt, Geolocation, Social Media Data
- Educational Background, Employer, Occupation, Work History

Source: 'Alternative Data Goes Mainstream in Financial Services', Datanami (2019)

Alternative Data FinTech Landscape

Source: 'Alternative Data Goes Mainstream in Financial Services', Datanami (2019)

Apple Credit Card

DHH
@dhh

She spoke to two Apple reps. Both very nice, courteous people representing an utterly broken and reprehensible system. The first person was like “I don’t know why, but I swear we’re not discriminating, IT’S JUST THE ALGORITHM”. I shit you not. “IT’S JUST THE ALGORITHM!”.

♡ 4,849 6:20 PM - Nov 8, 2019 ⓘ

Source: ‘Alternative Data Goes Mainstream in Financial Services’, Datanami (2019)

Apple Credit Card

Steve Wozniak 

@stevewoz

I'm a current Apple employee and founder of the company and the same thing happened to us (10x) despite not having any separate assets or accounts. Some say the blame is on Goldman Sachs but the way Apple is attached, they should share responsibility.

♡ 3,113 2:06 AM - Nov 10, 2019

Source: 'Alternative Data Goes Mainstream in Financial Services', Datanami (2019)

AI & U.S. Consumer Credit Laws [1]

- Equal Credit Opportunity Act (ECOA)
  - Disparate Treatment or Disparate Impact
  - Regulation B on Notices on Actions
- Fair Housing Act
- Fair Credit Reporting Act (FCRA)
  - Consumer Reporting Agencies and Consumer Reports
  - Notice Requirements on Adverse Actions
- Unfair, Deceptive, and Abusive Acts and Practices (UDAAPs) - CFPB
- Unfair and Deceptive Acts and Practices (UDAP) - FTC & States

AI & Privacy Laws[1]

- Europe – General Data Protection Regulation (GDPR)
- U.S. Federal –FCRA, Gramm Leach Bliley, & Right to Financial Privacy Act
- U.S. States – California Consumer Privacy Act (CCPA)

AI, Finance, & Geopolitics[1]

- Finance is Interconnected Globally and Regulated Locally
- Countries' Financial Sectors Vary in Development, Concentration and Public Sector Involvement
- International Organizations (OECD …) Guidelines generally at High level
- Financial Policy Standard Setters (Basal, FATF, IOSCO ..) are Non-Binding
- No Internationally Enforceable Standards
- Competing models on AI, Finance & Policy Trade-offs

References

1. ‘Artificial Intelligence Applications in Financial Services’ Oliver Wyman
2. ‘Artificial Intelligence & Financial Services – Fall 2019 Report’ Mayer Brown
3. ‘Fintech: Understanding AI Use in Financial Services’ Julie Stackhouse, St. Louis Federal Reserve Bank