AI and Blockchain:
Future Convergence and Synergies

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Data Scientist:
The Sexiest Job of the 21st Century

Meet the people who can coax treasure out of messy, unstructured data.

by Thomas H. Davenport and D.J. Patil

When Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited their friends and colleagues to join. But users weren't seeking out connections with the people who were already on the site at the rate executives had expected. Something was apparently missing in the social experience. As one LinkedIn manager put it, "It was like arriving at a conference reception and realizing you don't know anyone. So you just stand in the corner sipping your drink—and you probably leave early."

Brief history of the recent resurgence in AI
(part 1 of 2)

Web companies (e.g., Google, Facebook, Amazon etc.) start producing lot of data

They need to make sense of this data to build better services, to target their users with advertisement, etc.

There is a need for tools for handling and analysing Big Data

New computational paradigms start emerging (Hadoop, Spark, NO SQL, etc...)

Big Data Landscape 2016

Infrastructure

Hadoop On-Premise
cloudera, Hortonworks, MAPR, Pivotal, IBM InfoSphere, splice MACHINE, bluedata, jethro

Hadoop in the Cloud
amazon web services, Microsoft Azure, Google Cloud Platform, IBM InfoSphere, CAZENA, TREASURE DATA, altiscale, Qubole, xplenty

Spark
databricks, GridGain, TACHYON NEXUS

Cluster Services
amazon web services, kubernetes, HPCC SYSTEMS, docker, MESOSPHERE, Core OS, pepperdata, StackIQ

NoSQL Databases
amazon DynamoDB, Google Cloud Platform, ORACLE, Microsoft Azure, MarkLogic, mongoDB, DATASTAX, AEROSPIKE, Couchbase, SequoiaDB, redislabs, influxdata

NewSQL Databases
SAP HANA, Clustrix, Pivotal, memsql, paradigm4, NuoDB, MariaDB, VOLTDB, citusdata, deepdb, Trafodion, Cockroach LABS

Graph Databases
neo4j, GIRAPH, OrientDB, InfiniteGraph

MPP Databases
TERADATA, VERTICA, NETEZZA, kognitio, dremio

Cloud EDW
amazon web services, Google Cloud Platform, Microsoft Azure, Pivotal, snowflake, WATERLINE, Infoworks

Data Transformation
alteryx, TRIFACTA, tamr, Paxata, StreamSets, Alation

Data Integration
informatica, MuleSoft, snapLogic, BedrockData

Management / Monitoring
New Relic, APPDYNAMICS, amazon web services, Actifio, Numerify, splunk, DATADOG, Rocana, Anodot

Security
TANIUM, illumio, CODE42, DataGravity, CipherCloud, VECTRA, sqrrl, BlueTalon

Storage
amazon web services, Google Cloud Platform, Microsoft Azure, panasas, nimblestorage, Qumulo

App Dev
apigee, CASK, Keen IO, Typesafe, CONCURRENT

Crowd-sourcing
amazon mechanical turk, CrowdFlower, WorkFusion

Analytics

Analyst Platforms
Palantir, AYASDI, Quid, enigma, Digital Reasoning, ORBITAL INSIGHT

Analytics Platforms
Microsoft, guavus, Datameer, inter|ana

Data Science Platforms
context relevant, CONTINUUM ANALYTICS, DataRobot, Alpine, ADATAO, MODE, plotly, dataiku, nutonian, DOMINO, sense, yhat, ALGORITHMIA

Visualization
tableau, Google Cloud Platform, Roambi, ZOOMDATA, Qlik, CHARTIO

BI Platforms
Power BI, amazon web services, salesforce, DOMO, Wave Analytics, GoodData, birst, platfora, kyvos insights, looker, atscale, ARCADIA, SiSense

Statistical Computing
SAS, SPSS, MATLAB

Log Analytics
splunk, sumologic, kibana, CLOUD PHYSICS, loggly

Social Analytics
NETBASE, DATASIFT, tracx, bitly, synthesio, bottlenose, simplereach

Real-Time
amazon web services, METAMARKETS, confluent, DATATORRENT, dataArtisans

Machine Learning
Azure Machine Learning, amazon web services, H2O.ai, Dato, SKYTREE, rapidminer, DATARPM, deepsense.io, ViSENZE, PredictionIO, glowfi.sh

Speech & NLP
NarrativeScience, api.ai, NUANCE, Gridspace, semanticmachines, cortical.io, maluuba, MindMeld, IDIBON, yseop

Horizontal AI
IBM Watson, Cortana, VIV, sentient technologies, nervana SYSTEMS, vicarious, nara, Numenta, HyperScience, SCALED INFERENCE, MetaMind, clarifai, DEXTRO, Geometric Intelligence

Search
HP, Autonomy, ORACLE ENDECA, EXALEAD, Lucidworks, elastic, ThoughtSpot, MAANA, swiftype, Algolia, SINEQUA

Data Services
uO, OPERA SOLUTIONS, Mu Sigma, DATASCIENCE, SILICON VALLEY DATA SCIENCE, kaggle, datascope, DataKind

For Business Analysts
OrigamiLogic, ClearStory, CIRRO, import io

SMB / Commerce
Google Analytics, AMPLITUDE, RJMetrics, BLUECORE, sumAll, granify, Airtable, retention SCIENCE, custora

Cross-Infrastructure/Analytics
amazon web services, Google, Microsoft, IBM, SAP, SAS, HP, Autonomy, vmware, talend, TIBCO, TERADATA, ORACLE, NetApp

Applications

Sales & Marketing
RADIUS, Gainsight, bloomreach, Zeta, blue yonder, livefyre, Lattice, kahuna, SAILTHRU, persado, infer, sense, AVISO, ACTIONIQ, QUANTIFIND

Customer Service
MEDALLIA, ATTENSITY, CLARABRIDGE, STELLAService, NGDATA, Preact, DigitalGenius, appuri, wise.io, ENGAGIO

Human Capital
gild, Connectifier, textio, entelo, hiQ

Legal
RAVEL, JUDICATA, Everlaw, eBrevia, PREMONITION

Ad Optimization
MediaMath, Integral Ad Science, OpenX, rocketfuel, Adgorithms, theTradeDesk, LiveIntent, dstillery, DataXu, Appier, TAPAD

Security
CYLANCE, CounterTack, cybereason, ThreatMetrix, AREA 1 SECURITY, SentinelOne, Recorded Future, Guardian Analytics, FORTSCALE, sift science, Keybase, feedzai, SIGNIFYD

Vertical AI Applications
facebook, X, Clara, KASISTO, lumiata

Publisher Tools
outbrain, mixpanel, Chartbeat, yieldbot, Yieldmo

Govt/ Regulation
Socrata, OPENGOV, FiscalNote, enigma, PREDPOL, mark43, OpenDataSoft

Finance
Affirm, LendingClub, OnDeck, Kreditech, zestfinance, LendUp, Kabbage, tidemark, Payoff, INSIKT, Zuora, Dataminr, Lenddo, KENSHO, AIDYIA, iSENTIUM, Quantopian, sentient technologies

Education/ Learning
KNEWTON, Clever, declara, PANORAMA, knowre

Life Sciences
23andMe, Counsyl, PATHWAY GENOMICS, Recombine, deep genomics, KYRUUS, FLATIRON, zymergen, HealthTap, METABIOTA, ZEPHYR HEALTH, ovia, Ginger.io, transcriptic, Glow, enlitic, AiCure, Atomwise

Industries
OPOWER, eHarmony, RetailNext, STITCH FIX, duetto, WorkFusion, BLUE RIVER, TACHYUS, SwiftKey, Seeq, FarmLogs, HowGood, celect, SIGHT MACHINE, statmuse, BOXEVER

Open Source

Framework
hadoop HDFS, hadoop MapReduce, YARN, MESOS, Spark, TEZ, Apache Kylin, Flink, CDAP

Query / Data Flow
SLAMDATA, APACHE DRILL, HIVE, Google Cloud Dataflow

Data Access
cassandra, Apache HBASE, accumulo, mongoDB, SciDB, kafka, CouchDB, riak, OPENTSDB, nifi

Coordination
talend, OOZIE, Apache Zookeeper, Apache Ambari

Real-Time
STORM, Spark, APEX, Flink, TACHYON, druid

Stat Tools
R, Scala, NumPy, SciPy

Machine Learning
mllib, mahout, Aerosolve, Apache SINGA, MADlib, Caffe, torch, CNTK, TensorFlow, learn, WEKA, FeatureFu, VELES, DIMSUM, jupyter, DL4J

Search
elasticsearch, Apache Ranger, Solr, Lucene

Security
Apache Ranger

Visualization
Zeppelin

Data Sources & APIs

Health
JAWBONE, GARMIN, practice fusion, fitbit, Withings, VALIDIC, netatmo, kinsa, Human API

IOT
UPTAKE, ThingWorx, helium, samsara, AUGURY, estimote

Financial & Economic Data
Bloomberg, DOW JONES, YODLEE, PREMISE, S&P CAPITAL IQ, quandl, xignite, CB INSIGHTS, mattermark, estimize, PLAID

Air / Space / Sea
PLANET LABS, spire, WINDWARD, CRUISE, SKYCATCH, Airware, DroneDeploy

Location/People/Entities
GARMIN, foursquare, InsideView, esri, STREETLINE, CARTODB, factual, PlaceIQ, Crimson Hexagon, placemeter, BASIS, Sense 360

Other
qualtrics, panjiva, DATA.GOV

Incubators & Schools
GA, DataCamp, INSIGHT, DataElite, METIS, The Data Incubator

FIRSTMARK

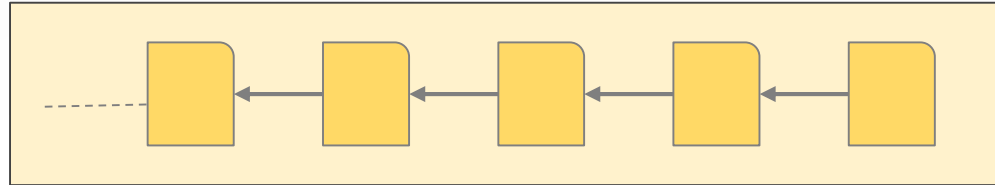# Brief history of the recent resurgence in AI
(part 2 of 2)
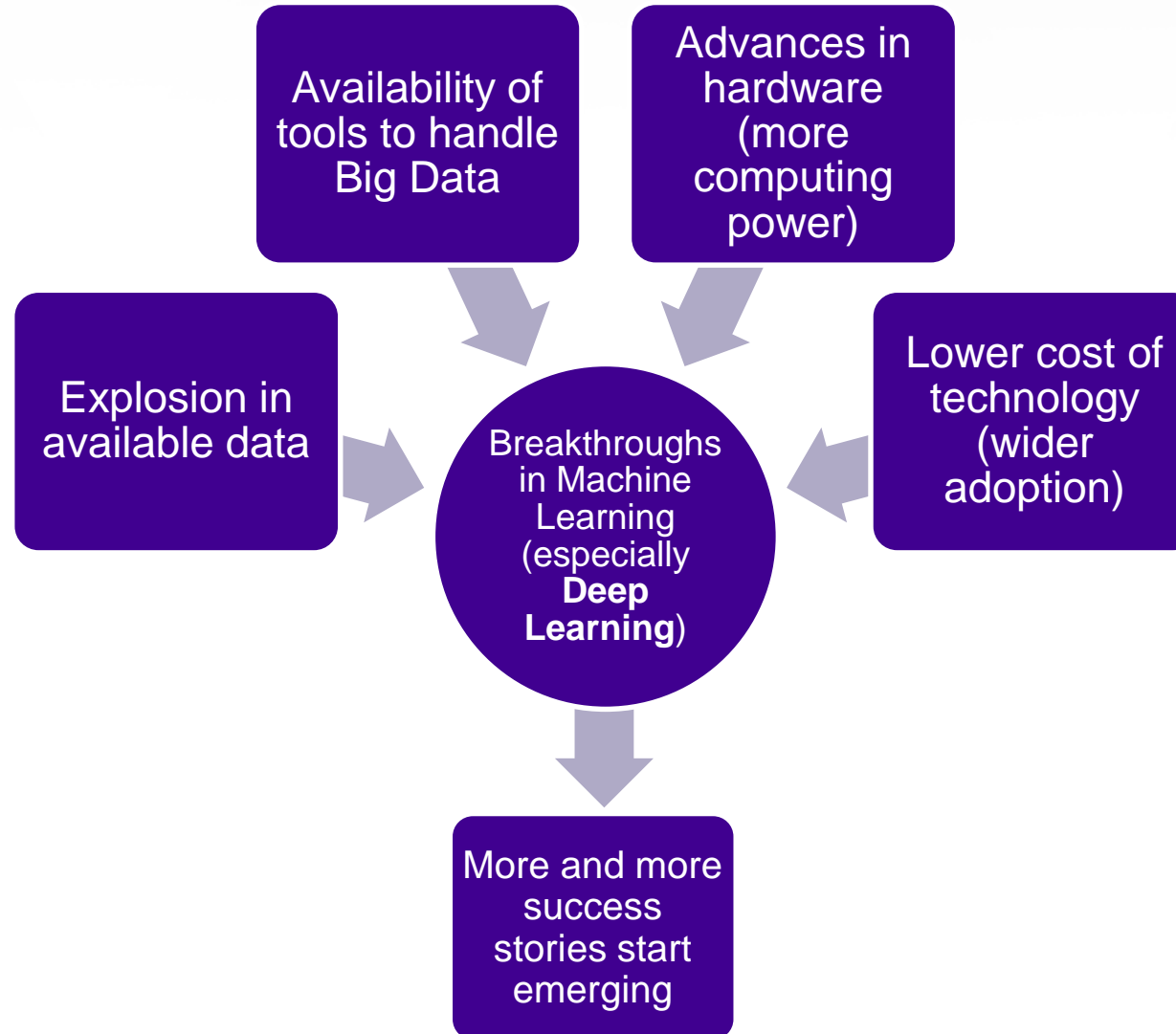
AI: limits & concerns

- Privacy
- Transparency, Accountability, Explainability
- Fairness, Algorithmic Bias
- Monopolization of AI power by a few big players
- Creation of fake news (fake but realistic photos, voice, videos)

Blockchain: a decentralized data structure

- list of **blocks of transactions**
- **replicated** in all the nodes of the network
- kept **synchronized**
  - structure is append only!
- **Immutable**: it is almost impossible to modify any information without having network consensus.

Limits and concerns:
- Security
- Scalability
- Efficiency
- Energy consumption

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The DAO attack: unexpected use of code

- The DAO (decentralized autonomous organization) was the largest online crowdfunding service.
    - a form of investor-directed venture capital fund
    - it was instantiated on the Ethereum blockchain
    - no conventional management structure or board of directors.
    - 150M$ market cap (~11000 investors)

- On the 16th June 2016, an attacker "stole" ~50M USD
    - …using the contract in a correct, but unexpected way.

https://coinmarketcap.com

Points of views

"The DAO's **code** controls and sets forth all terms of The DAO Creation and usage."

From the DAO service level agreement.

Ethereum is a decentralized platform that runs programs exactly as programmed without any possibility of *downtime*, *censorship*, *fraud* or **third party interference**.

www.ethereum.org

"I have carefully examined the code of The DAO and found a feature where splitting is rewarded with additional ether. I have made use of this feature and have rightfully claimed 3,641,694 ether. I am disappointed by those who are characterizing the use of this intentional feature as "theft". "

The DAO Attacker

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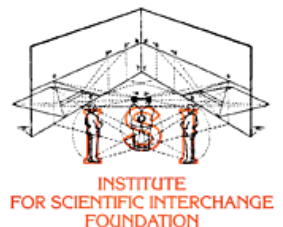
Security issues: bugs that harm the contract

Rubixi

Bug: wrong naming of a function

Effect: users were able to steal the owner fees

PiggyBank

Bug: wrong way to initialize a variable

Effect: the owner fees were constantly growing, instead of being fixed to 3%

TheFunction

Bug: Upon errors in a money send, it reverts the execution

Effect: users can stop the contract (ransomware attack)

Bartoletti, Carta, Cimoli, Saia. *Dissecting Ponzi schemes on Ethereum* (P2PFISY'17)

New technology, new frauds

- Scam wallets

- Exchange scams

- Phishing scam

- Money laundering

- Ransomware

- Ponzi schemes

- Fraudolent ICOs

- Smart contracts with a mismatch between the declared and actual behaviour

- Exploitation of bugs

bitcointalk.org > Economy > Trading > Scam accusations

		Subject	Started by	Replies	Views	Last post
		Scam Report Format (Use it 📌 to make scam reports properly) « 1 2 3 All »	escrow.ms	44	73731	June 19, 2018, 11:27:56 AM by MedallionGroupCo
		[EDU] How to spot a 📌 scammer (Read this before doing any transactions!) « 1 2 ... 9 10 All »	Tomatocage	193	109719	May 24, 2018, 07:30:24 AM by nutildah
		[EDU] When leaving 📌 negative feedback, remember to make it negative! « 1 2 All »	DiamondCardz	32	59970	December 19, 2017, 05:17:11 AM by cipher-x_09
		Arbitao is 100% a SCAM !!! « 1 2 All »	YuTü.Co.in	35	563	**Today** at 03:22:40 AM by D3m1r4wanti
		Does someone knows about "Inbfund", is it scam?	muel_kim	0	2	**Today** at 02:50:28 AM by muel_kim
		[SCAM] CrowdMachine - Not paying my bounty	Arrrvin	2	74	**Today** at 02:23:55 AM by roccstar
		100% Proof that Monetize Coin is a SCAM !!!	Gleb Gamow	7	59	**Today** at 01:30:03 AM by crypt0j0e

The Monetize Coin Monetization Platform

The Monetize platform uses the Monetize Bot to generate a monthly return for investors.

To get started simply deposit either Bitcoin or Ethereum into your MonetizeCoin online wallet, purchase MNZ tokens either during the ICO, the integrated exchange or through our external exchange partners.

Choose a lending package to invest in and earn a daily dividend payment of upto 2% per day to your account.

$ 100 - $ 1000	$ 1001 - $ 5,000	$ 5001 - $ 10,000	$ 10,000 +
Monetize Bot	Monetize Bot	Monetize Bot	Monetize Bot
upto 40% monthly	upto 40% monthly	upto 40% monthly	upto 40% monthly
Capital Return 239 Days	Capital Return 179 Days	Capital Return 120 Days	Capital Return 99 Days
	+0.10% Daily Bonus	+0.20% Daily Bonus	+0.25% Daily Bonus

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How can AI+Blockchain help preventing/detecting frauds?

Blockchain
provides a public, distributed, non-proprietary, easily accessible, immutable, source of data

AI

provides the algorithms to learn patterns of past frauds and to train models able to detect new frauds or security risks early-on
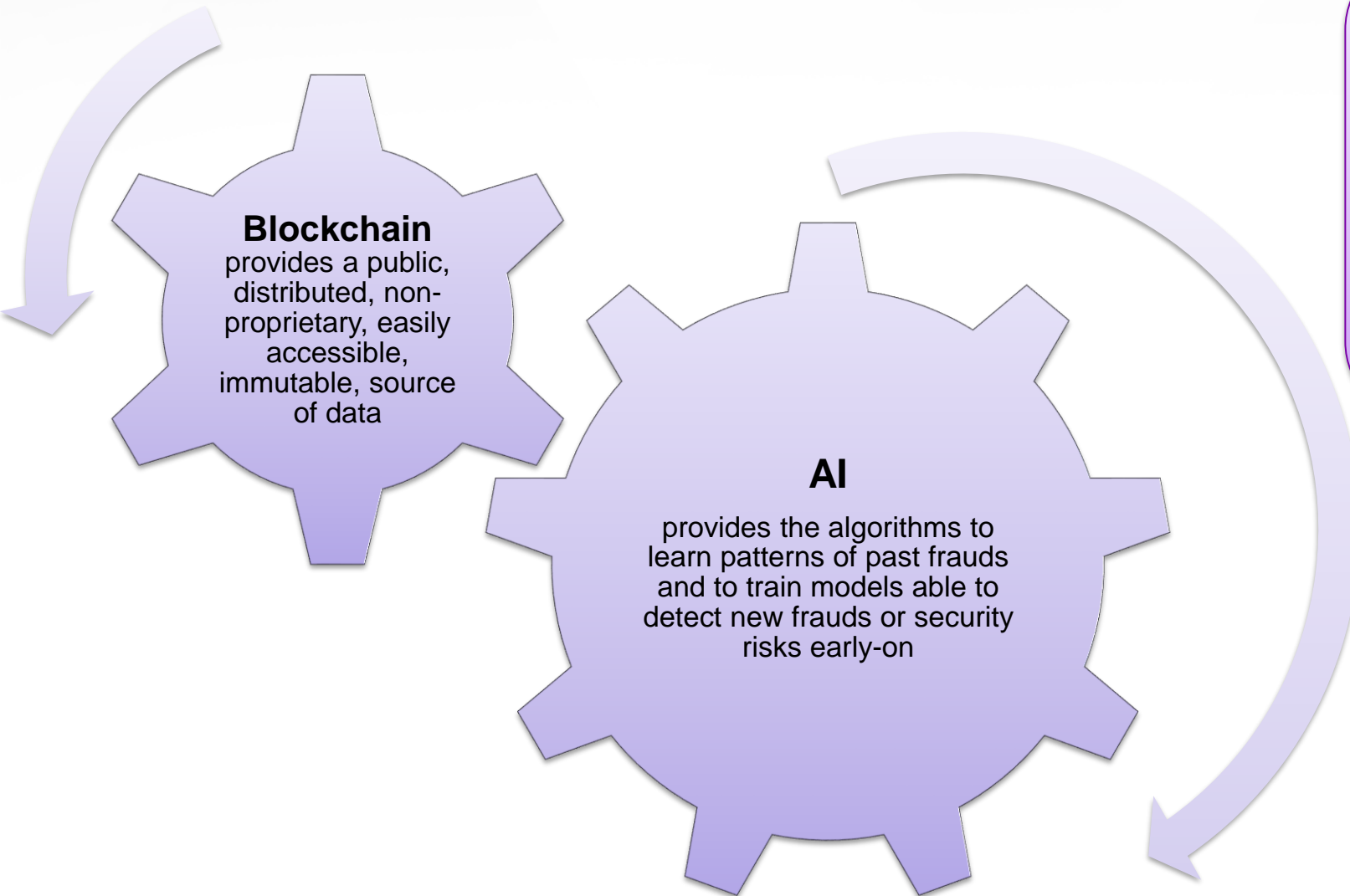
Fraud detection has been one of the early success story of Machine Learning (since the 90s)

Credit cards fraud detection, **Insurance** fraudolent claims detection, **Fiscal** fraud detection

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blockchain.unica.it/deponzifier/

Secure data sharing and marketplace for AI

Decentralized computing for AI

Explainable AI

Coordinating untrusting devices

Secure and scalable blockchains

Privacy-preserving personalization

Automated referee and governance

Blockchain for AI

AI for Blockchain
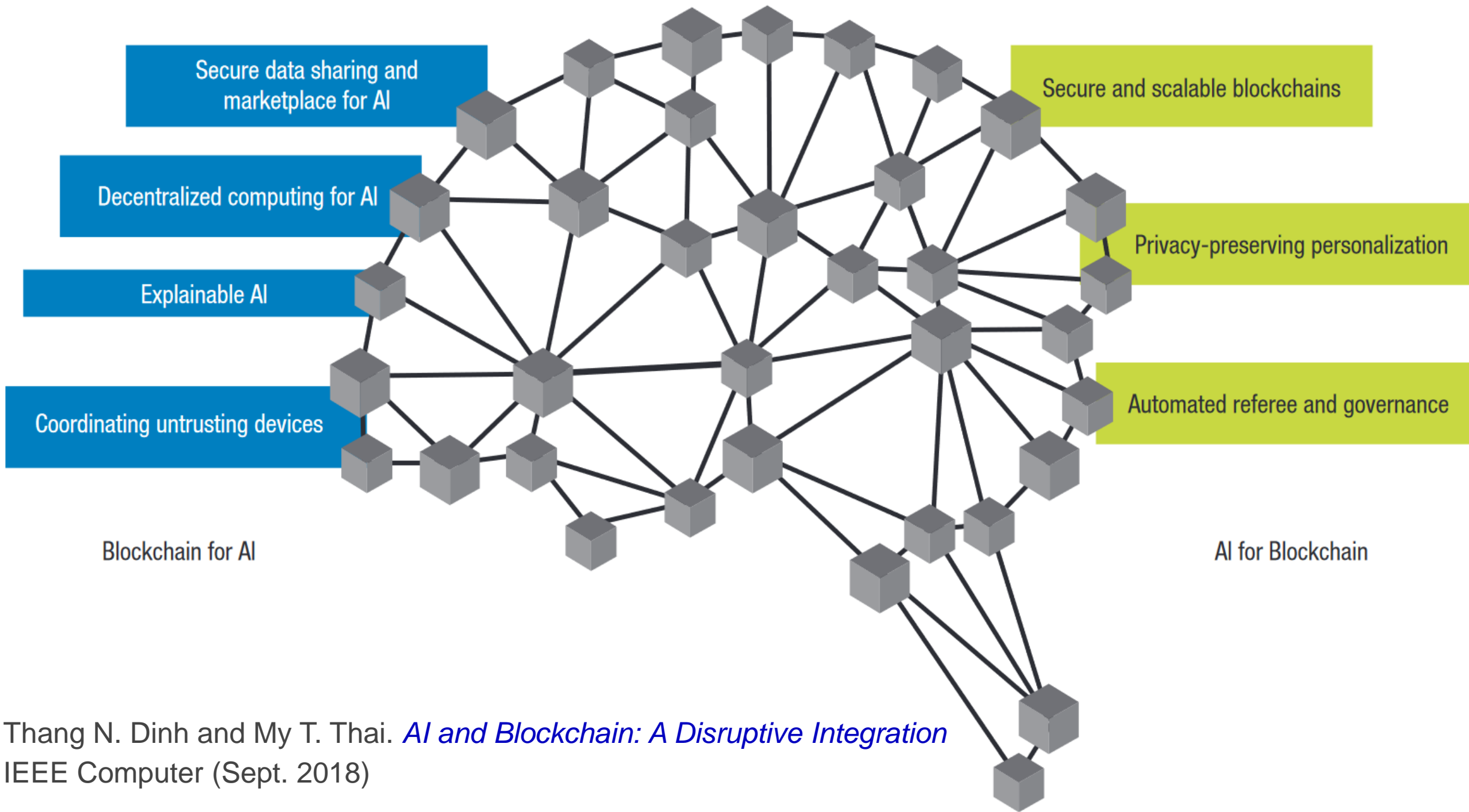
Thang N. Dinh and My T. Thai. *AI and Blockchain: A Disruptive Integration*
IEEE Computer (Sept. 2018)

Thank you!

> *"Blockchain and AI are the two extreme sides of the technology spectrum: one fostering centralized intelligence on close data platforms, the other promoting decentralized applications in an open-data environment. However, if we find an intelligent way to make them working together, the total positive externalities could be amplified in a blink."*

Francesco Corea *"The convergence of AI and Blockchain: what's the deal?"*

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Thanks for images, slides, and ideas to

- Thang N. Dinh, My T. Thai "AI and Blockchain: A Disruptive Integration" IEEE Computer (Sept. 2018)
- Massimo Bartoletti http://blockchain.unica.it/
- Francesco Corea "The convergence of AI and Blockchain: what's the deal?" https://medium.com/@Francesco_AI/the-convergence-of-ai-and-blockchain-whats-the-deal-60c618e3accc
- https://news.bitcoin.com/artificial-intelligence-and-cryptocurrency-separating-hype-from-reality/

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