

Journey of AI

Mumbai Artificial Intelligence Meetup #1

What is AI?

Artificial intelligence (AI) is intelligence exhibited by machines. In computer science, an ideal "intelligent" machine is a flexible rational agent that perceives its environment and takes actions that maximize its chance of success at some goal.



Is the idea really new?

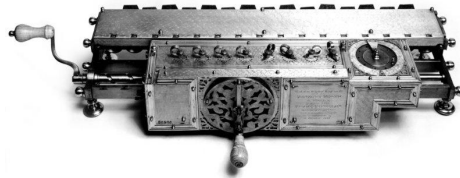


Ramon Llull
Combining
concepts
mechanically

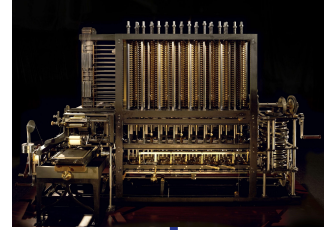
1275 CE

1672

Gottfried Leibniz's
Stepped Reckoner

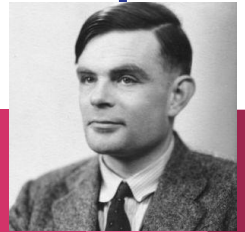


Difference Engine
Charles Babbage and
Ada Lovelace



1822-59

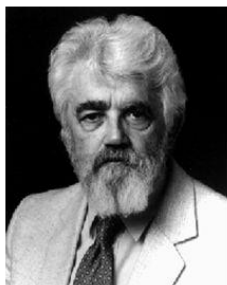
Church-Turing
Thesis



1939

The Birth of AI

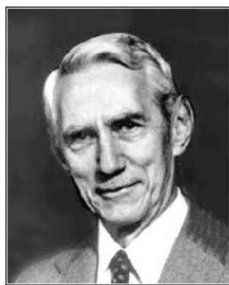
Dartmouth Conference: The Founding Fathers of AI



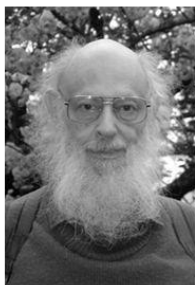
John McCarthy



Marvin Minsky



Claude Shannon



Ray Solomonoff

Alan Newell



Herbert Simon



Arthur Samuel



And three others...

Oliver Selfridge
(Pandemonium theory)

Nathaniel Rochester
(IBM, designed 701)

Trenchard More
(Natural Deduction)

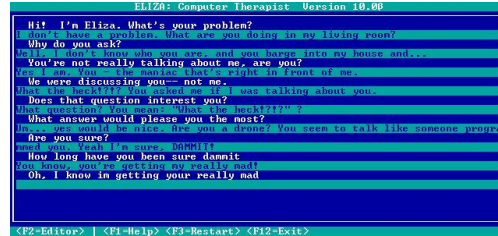
Dartmouth Conference laid the foundation for an ambitious vision that has affected research and development in engineering, mathematics, computer science, psychology, and many other fields ever since.



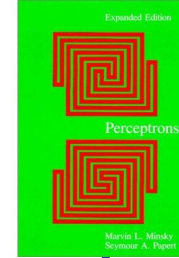
The Golden Years (1956-1974)



Geometric
Theorem
Prover built



ELIZA:
Computer
Therapist



1951

1956

1958

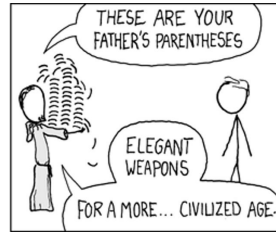
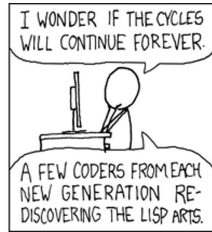
1965

1969

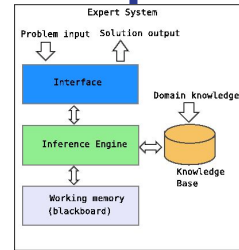
1973

1st neural net
machine built

1st agents for
chess and
checkers built

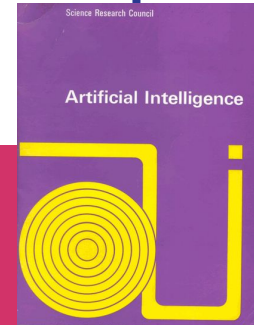


Lisp Invented

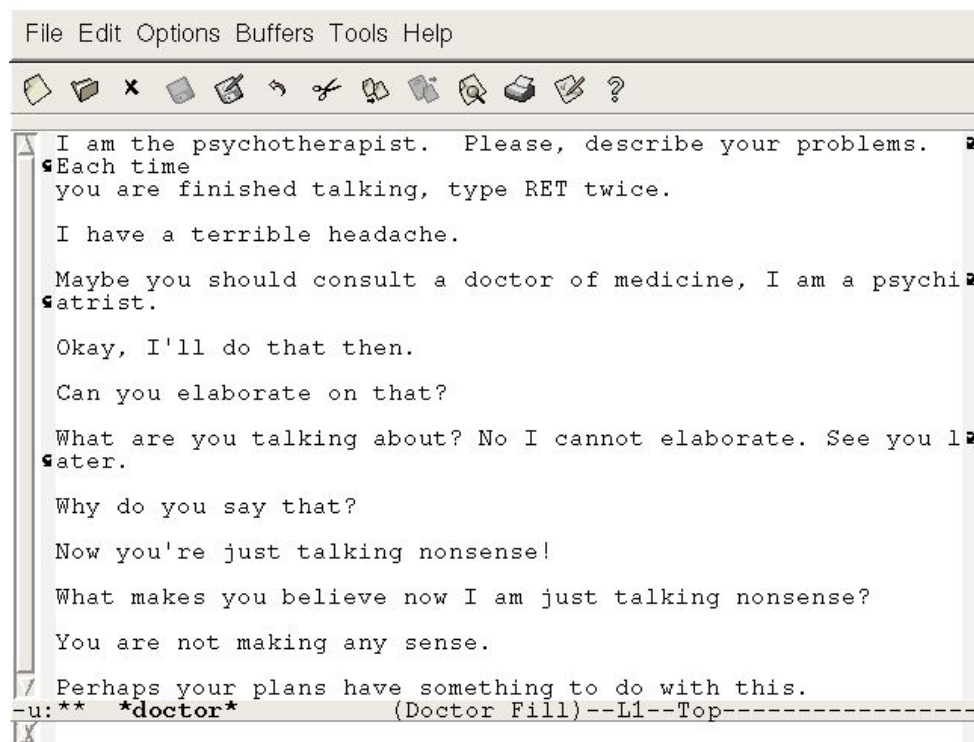


Dendral Initiated

Lighthill
Report



ELIZA - Computer Therapist



Optimism during the First Boom



Reasons for the First Winter (1974-80)

1. Computational Power
2. Combinatorial Explosion
3. Lack of systems to store and access huge amount of data
4. Structure of Logic needed to be revamped for supporting applications such as planning

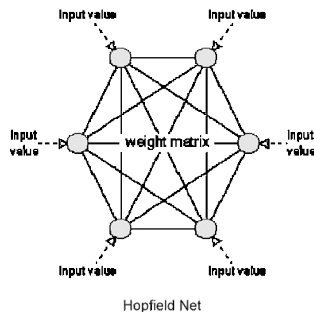
Despite of the funding being reduced drastically, this didn't deter some remarkable individuals from working further in AI. This led to the second boom in AI.



Boom (1980-87)

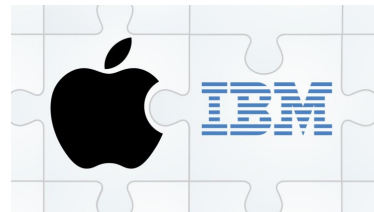


Association for the
Advancement of Artificial Intelligence



Hopfield Net

First Robot
Cars



Rise of Mac
and IBM

1979

1980

1982

1986

1987

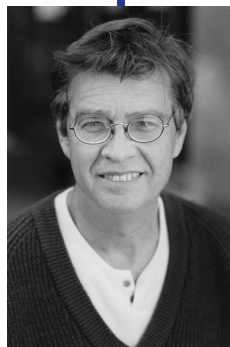
Stanford Cart -
First Autonomous
Vehicle

BKG defeats
world champion



David Rumelhart

Rise of
Backpropagation



AARON - Autonomous Drawing Program



Reasons for Second AI Winter (1987-93)

1. Downfall of LISP Machines and rise of IBM and Mac
2. Fifth Generation Project seemed far fetched
3. Strategic Computing Initiative by DARPA



1993-2001

Autonomous cars on highway



Othello: Murakami vs. Logistello



Takeshi Murakami
World Othello Champion



1997: The Logistello software crushed Murakami by 6 games to 0



1991

1994

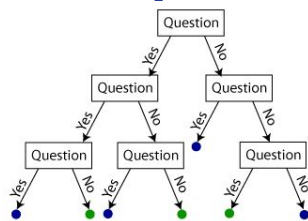
1995

1997

1998

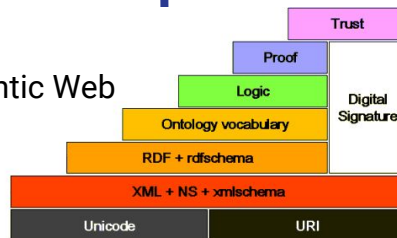
2000

2002



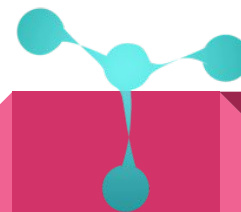
RDTs and SVM

Semantic Web



Google

Torch



Deep Blue vs Kasparov



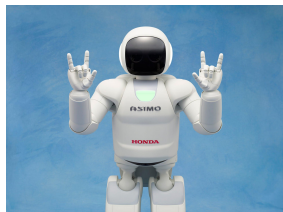
Quote #1

Many researchers in AI in 1990s deliberately called their work by other names, such as informatics, knowledge-based systems, cognitive systems or computational intelligence. In part, this may be because they considered their field to be fundamentally different from AI, but also the new names help to procure funding. In the commercial world at least, the failed promises of the AI Winter continue to haunt AI research, as the New York Times reported in 2005: "Computer scientists and software engineers avoided the term artificial intelligence for fear of being viewed as wild-eyed dreamers."

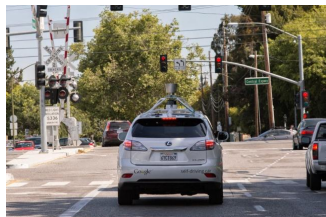
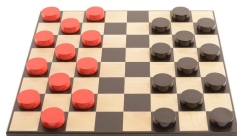


2000s - Present

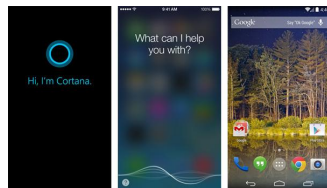
ASIMO



Checkers



Rise of the personal assistants



2004

2005

2006

2007

2009

2011

2016



DARPA Grand Challenge

"A fast learning algorithm for deep belief nets"
-- Hinton et al., 2006

"Reducing the dimensionality of data with neural networks"
-- Hinton & Salakhutdinov



Geoffrey Hinton
University of Toronto



GPU Revolution



Watson on a Quiz Show

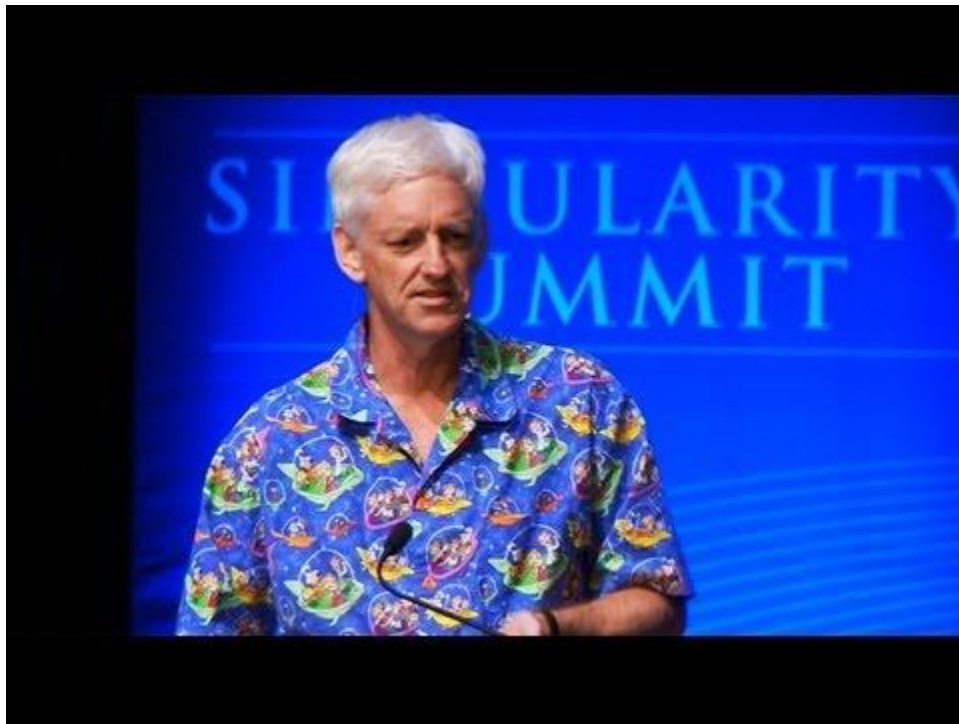


AlphaGo defeats Lee Sedol

ASIMO



Identifying Cats



Big Data Landscape 2016 (Version 3.0)

Infrastructure

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

Hadoop in the Cloud
amazon Microsoft Azure
Google Cloud Platform
IBM InfoSphere
CAZENA
altiscale
treasure data
bale

Spark
databricks
GridGain
TACHYON
NEXUS

Cluster Services
amazon web services
kubernets
docker
HICK SYSTEMS
MESOSPHERE
Core OS
pepperdata
StackIQ

NoSQL Databases
amazon dynamoDB
Microsoft Azure
mongoDB
KEROPIKE
SequoiaDB
redislabs
influxdata

NewSQL Databases
SAP HANA
Clustrix Pivotal
paradigm4
nuodb
memsql
VOLTDB
splice machine
MariaDB
citusdata
deepdb
Trafection
Cockroach LABS

Graph Databases
neo4j
SAP HANA
OrientDB
InfiniteGraph

MPP Databases
TERADATA
VERTICA
NETEZZA
Qlik
Action
kognitio
ASOL
dremio

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

Data Transformation
alteryx
talend
TRIFRATA
tamr
Paxata
StreamSets
Alation

Data Integration
informatica
MuleSoft
snaplogic
BedrockData
xplenty

Management / Monitoring
New Relic
APPDYNAMICS
amazon web services
actifio
Numerify
splunk
DATADOG
YOCOANO
DRIVEN
Anodot

Security
TANUM
illumio
CODE42
DataGravity
CipherCloud
VECTRA
nimblestorage
COHO
Gumulo

Storage
amazon web services
Google Cloud Platform
Microsoft Azure
panasas
nimblestorage
COHO
Gumulo

App Dev
apigee
CRSK
Typesafe
DRIVEN

Crowd-sourcing
amazon mechanical turk
CrowdFlower
WorkFusion

Cross-Infrastructure/Analytics

amazon web services Google Microsoft IBM SAP SAS data hp Autonomy VERTICA vmware TIBCO TERADATA ORACLE NetApp

Framework
Hadoop
YARN
Spark
MESOS
TEZ
Flink
CDAP

Query / Data Flow
SLAMDATA
APACHE CDRILL
Google Cloud Dataflow

Data Access
cassandra
HBASE
mongoDB
kafka
SciDB
OPEN TICS
riak
CouchDB

Coordination
talend
Apache Zookeeper
Apache Ambari

Real-Time
STORM
Spark
APEX
TACHYON
Flink
druid

Stat Tools
ScalaLab
Numpy
SciPy

Data Sources & APIs

Health
JAWBONE GARMIN
practicefusion
Withings
fitbit
VALIDIC
netatmo
kinsa
Human API

IOT
UPTAKE
helium
samsara
ThingWorx
estimate

Financial & Economic Data
Bloomberg
THOMSON REUTERS
DOW JONES
YODLEE
PREMISE
S&P CAPITAL IQ
quandl
xignite
CBINSGHTS
mattermark
StockWits
Estimize
PLAID

Air / Space / Sea
PLANET LABS
spire
WINDWARD
CRUISE
SKYWATCH
Airware
DroneDeploy

Location / People / Entities
axiom
Experian
EPSILON
InsideView
GARMIN
foursquare
STREETLINE
factual
CIRCULATE
placemeter
BASIS
Sense

Other
qualtrics
panjiva
DATA.GOV

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

Analytics

Analyst Platforms
Palantir
AYASDI
Quid enigma
Digital Reasoning
ORBITALINSIGHT

Analytics Platforms
Microsoft
guavus
Datameer
Bottlenose
inter|ana

Data Science Platforms
coherent relevant
CONTINUUM
DataRobot
Alpine
ARIMO
MODE plotly
dataiku
DOMINO
sense
ALGORITHMIA

Visualization
tableau
Google Cloud Platform
Qlik
looker
Roambi
BISSIDE
COMDATA
datorama
CHARTIO

BI Platforms
Power BI
amazon web services
DOMO
Wave Analytics
GoodData
birst
platform
at scale
ARCADIA
BISSIDE

Statistical Computing
sas
SPSS
MATLAB

Log Analytics
splunk
sumologic
hibana
CLOUD PHYSICS
loggly

Social Analytics
Hootsuite
NETBASE
DATASIFT
bitly
synthesio
SmileReach

Real-Time
amazon web services
METAMARKETS
striim
confluent
DATATOURNAMENT
dataArbiters

Machine Learning
Acure Machine Learning
amazon web services
H2O
SKYTREE
rapiminer
DATAFORM
deepnlp
VIZEN
PredictionIO
glowfish

Speech & NLP
NarrativeScience
NUANCE
WatsonAlpha
semantic
ARRIA
apical
portico
MindMeld
IDIBON
VEXPO

Horizontal AI
IBM Watson
Cortana
sentient
vicarious
noro
Numenta
HyperScience
clarifai
MetaMind

Search
hp
Autonomy
ORACLE
ENDECA
EXALENG
Lucidworks
elastic
ThoughtSpot
MAANA
swiftype
Algolia
SINEQUA

Data Services
UO OPERA
Mu Sigma
EXL
DATA SCIENCE
DATA SCIENCE
kaggle
DataKind
DataKind

For Business Analysts
OrigamiLogic
ClearStory
CIRRO
import io

Web / Mobile / Commerce
Google Analytics
mixpanel
RJMetrics
BLUECORE
AMPLITUDE
granify
sumall
Airtable
retention custora

Applications

Sales & Marketing
RADIUS
Gainsight
bloomreach
Zeta
EVERSTRING
livefyre
blueyonder
Lattice
@kahuna
infer
SAULTHRU
persado
AVISO
sense
QUANTIFIND
ACTIONIQ
fuse/machines
ENAGIO

Customer Service
MEDALLIA
ATTENSIY
CLARABRIDGE
CLICKFOX
STELLAService
NGDATA
Preact
DigitalGenius
appurlo
Wise.io

Human Capital
gild
Connectifier
textic
entelo
hiQ
PREMATION

Legal
RAVEL
JUDICATA
Everlaw
Brevia

Ad Optimization
AppNexus
MediaMath
criteo
OpenX
rocketfuel
Integral
theTradeDesk
AdSource
distillery
LiveIntent
TAPAD
DataXu
Cupier
MOAT

Security
CYCLANE
CounterTrack
cyberason
ThreatMetrix
SentinelOne
Recorded Future
Guardian Analytics
FORTSCALE
siftscience
Yaybase
feedzai
SIGNIFYD

Vertical AI Applications
Facebook
Clara
KASIST
lumina

Publisher Tools
outbrain
Taboola
quantcast
Chartbeat
yieldbot
Yieldmo

Govt / Regulation
Socrata
OPENGOV
FiscalNote
enigma
mark43
PREPPOS
OpenDataSoft

Finance
affirm
LendingClub
OnDeck
Kreditech
LendUp
Kabbage
tidemark
INSIKT
Zuora
Datamir
Lenddo
KENSHC
AIDYIA
ISENTIUM
Quantopian

Education / Learning
KNEWTON
Clever
Declara
PANORAMA
knowre

Life Sciences
23andMe
Counsyl
Recombine
FLATIRON
XZYMERGEN
HealthTap
METABIOTA
ZEPHYR
HEALTH
oviva
Gingerio
transcriptic
Glow
enlitic
AiCure
Atomwise

Industries
OPower
eHarmony
RetailNext
STITCH FIX
WorkFusion
TACHYUS
Seeq
FarmLogs
SwiftKey
HowGood
elect
statmuse
BOEVER

Open Source

Machine Learning
mlib
Apache SINGA
MAlib
TensorFlow
DL4J


Search
elasticsearch
Solr
Lucene

Security
Apache Ranger
Kippalim

Incubators & Schools

Quote #2

As one observer has noted, "Because AI was a leading-edge technology, it arrived in this world too early. As a consequence, the AI application community had to ride many waves of technological quick fixes and fads. . . . Many of these integration problems are now being addressed head on by a broad community of information technologists using Internet-based frameworks such as CORBA [common object request broker architecture] and the World Wide Web" (Shrobe, 1996).




Where we stand today?

1. Better than humans in Image Classification (`14)
2. Near human accuracy in translation (`16)
3. Speech recognition is used in almost all domains (`11)
4. Speech to sound is on par with humans (`16)
5. In Radiology we have systems that are on par and better than humans
6. Major strategic and almost all decisions by Govt. and Businesses are now AI assisted
7.



Quote #3

According to Bloomberg's Jack Clark, 2015 has been a landmark year for artificial intelligence, with the number of software projects that use AI within Google increasing from a "sporadic usage" in 2012 to more than 2,700 projects. Clark also presents data indicating that error rates in image processing tasks have fallen significantly since 2011. He attributes this to an increase in affordable neural networks, due to a rise in cloud computing infrastructure and to an increase in research tools and datasets. Other cited examples include Microsoft's development of a Skype system that can automatically translate from one language to another and Facebook's system that can describe images to blind people.



The background is a solid pink color. In the top right corner, there is a decorative pattern of overlapping geometric shapes, including triangles and squares, in various shades of pink and magenta.

What will Future
look like?

References

1. <http://aitopics.org/misc/brief-history>
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10. <https://www.nap.edu/read/6323/chapter/11#224>
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