

## **History and Key Events of AI and Data Analytics:**

- I. 1960s: Foundation of Computing
  - Mainframe, business computing, IBM 360/370; computer as calculating machine
  - “I think there is a world market for about five computers.” – Thomas J. Watson, Jr., 2<sup>nd</sup> president of IBM (1952-1971)
- II. 1970s: Beginning of Internet & AI
  - AI, “Human Problem Solving,” A. Newell & H. Simon (father of AI), 1972; computer to simulate human intelligence
  - ARPANET, ITPO, B. Kohn & V. Cerf (father of Internet), 1972; computer as networking device (BBN, Stanford)
  - LAN, workstations (DEC, SUN)
- III. 1980s: Personal Computing, DBMS & Expert Systems
  - PCs, Gates & Jobs; GUIs (Xerox PARC)
  - RDBMS, E. F. Codd
  - Expert Systems, Prolog, Lisp; MYCIN, DENDRAL (Stanford), PROSPECTOR, XCON; all commercial systems failed! thus entered the “AI Winter”
- IV. 1990s: Data Mining, KDD, WWW & Surface Web (Web 1.0)
  - Symbolic AI; decision trees, ID3
  - RDBMS, data mining, knowledge discovery from databases (KDD); ACM KDD, IEEE ICDM conferences
  - Connectionists AI; Multi-layered Perceptrons, UCSD, D. Rumelhart & J. McClelland (“Parallel Distributed Processing,” 1989), G. Hinton, M. Jordan; Self-Organizing Maps (SOM, 1995) T. Kohonen
  - World-Wide Web (WWW), html/http, T. Berners-Lee (father of Web), first browser Mosaic (M. Andreessen; browser, cloud computing, VC, Andreessen-Horowitz); Search Engines, Glimpse, OpenFind (UA); Lycos, Alta Vista, Excite, Yahoo (1997), Google (1999; PageRank; Stanford), “Surface Web”
- V. 2000s: Social Media Systems, SNA & Web 2.0
  - Web services, web APIs; 2005, Web 2.0, “Social Web,” crowd-sourcing systems; wisdom of the crowd, Power Law distribution, “Long Tail”

- Network science, social network analysis (SNA); A. Barabasi (Scale-Free Network), D. Watts (Small World Network), six degrees of separation; many Science & Nature papers
- MySpace (2005-2008) to Facebook (2004+), 2.6B active monthly users, Q4, 2018

VI. 2010s: Big Data, Mobile Web & AI

- More data mining and machine learning applications; Support Vector Machine (SVM), Random Forest, Big Data, Hadoop, MapReduce (Google), cloud computing
- 2010+, # of mobile devices > # of PCs, Web 3.0?, “Mobile Web” ; IoTs, cybersecurity, Target data breach, 40M records (credit cards), 2014; Yahoo data breach, 1B records (email accounts), 2016
- 2015+ AI Resurgence, Web 4.0?; ImageNet Challenge; unstructured data, no feature engineering; Image Recognition (Convolutional NN; Google Brain, A. Ng), Machine Translation (Recurrent NN, LSTM, Seq2Seq; Google Translate); G. Hinton, Y. LeCun, Y. Bengio, from NIPS to NeurIPS and ICLR; from Deep Blue (IBM, chess, 1996) to AlphaGo (2016, Nature; DeepMind) & AlphaZero (2018, Science; Google DeepMind) to mammograms reading (Nature, 1/1/2020)

VII. 2020+: AI, 5G, Gene Editing, and the Unknowns

- Consumer privacy, from EU GDPR (General Data Protection Regulation, effective 5/25/2018) to California CCPA (California’s Consumer Protection Act; effective 1/1/2020)
- Political Disinformation, Deepfake
- Smart City; Smart Health; AI, 5G; drones, Autonomous Vehicles,
- Gene editing, CRISPR, “Artificial Life”???
- “AI Singularity,” “Matrix,” “Ex Machina” (“god from the machine”); “AI’s humanity’s biggest existential threat...summoning the demon,” E. Musk, MIT 2014 (Steven Hawking echoed the same sentiment)??? Another 60 years???