How Ugly Can It Be?
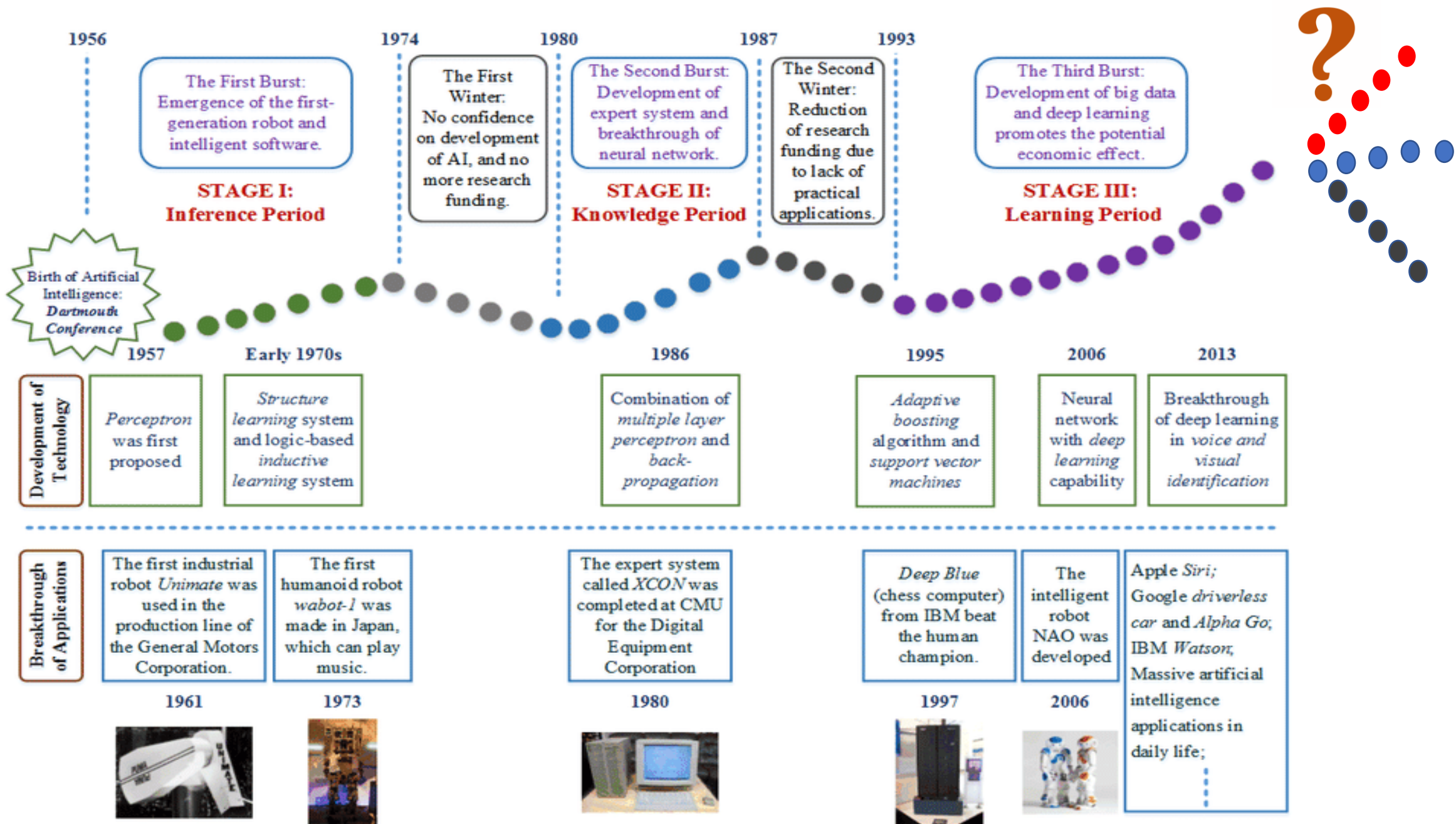
On The Good, The Bad and The Ugly of AI for IoT and Sensor Network

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1956 The First Burst: Emergence of the first-generation robot and intelligent software.

STAGE I: Inference Period

1974 The First Winter: No confidence on development of AI, and no more research funding.

1980 The Second Burst: Development of expert system and breakthrough of neural network.

STAGE II: Knowledge Period

1987 The Second Winter: Reduction of research funding due to lack of practical applications.

1993 The Third Burst: Development of big data and deep learning promotes the potential economic effect.

STAGE III: Learning Period

Birth of Artificial Intelligence: *Dartmouth Conference*

Development of Technology

1957	Early 1970s	1986	1995	2006	2013
Perceptron was first proposed	*Structure learning* system and logic-based *inductive learning* system	Combination of *multiple layer perceptron* and *back-propagation*	*Adaptive boosting* algorithm and *support vector machines*	Neural network with *deep learning* capability	Breakthrough of deep learning in *voice and visual identification*

Breakthrough of Applications

The first industrial robot *Unimate* was used in the production line of the General Motors Corporation.	The first humanoid robot *wabot-1* was made in Japan, which can play music.	The expert system called *XCON* was completed at CMU for the Digital Equipment Corporation	*Deep Blue* (chess computer) from IBM beat the human champion.	The intelligent robot NAO was developed	Apple *Siri;* Google *driverless car* and *Alpha Go;* IBM *Watson;* Massive artificial intelligence applications in daily life;
1961	1973	1980	1997	2006	

Source: Xue-bo Jin, et. al. "State-of-the-Art Mobile Intelligence: Enabling Robots to Move Like Humans by Estimating Mobility with Artificial Intelligence"

Challenges of AI for IoT

- **Completeness**: you don't know
  what you don't know

- **Robustness**: small changes to inputs,
  big changes to outputs

- **Efficiency**: finding the best model
  for a given architecture, fast

- **Adaptiveness**: updating the edge, on the fly