Transforming SMEs and Manufacturing industry business into "*AI* ready" powered by the *ABCI*

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ABCI

AIST

Everyone talks about it, and nobody really knows…

"Society 5.0"

by Council for Science, Technology and Innovation (CSTI), Japan
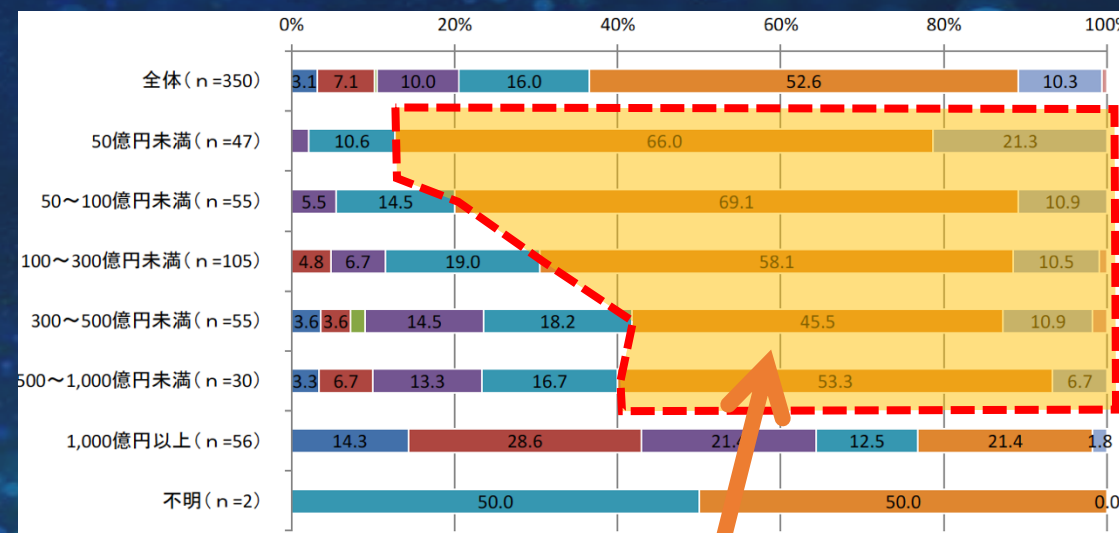
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AI is supposed to be changing industry

Gov't strong push
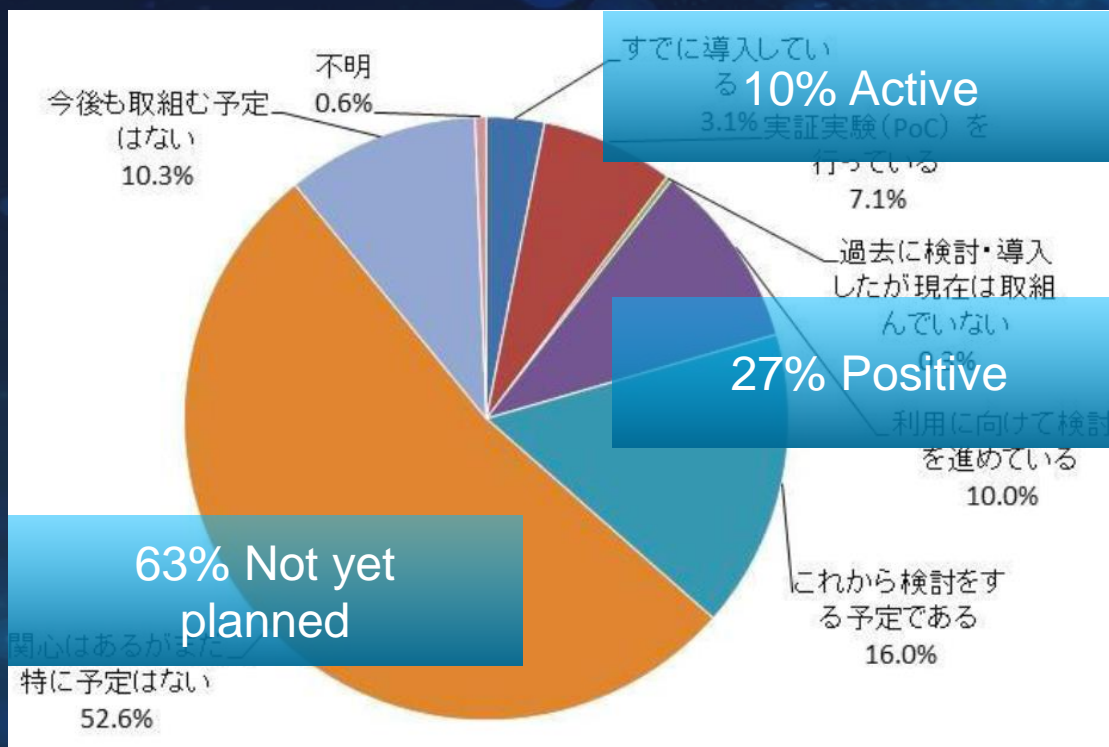
CEO's headache…

SMEs - not ready for AI

10% Active

27% Positive

63% Not yet planned

Maybe it's a good idea, but …

Big Wave again… too late or still in time?

Approaches for AI

5th Generation Computing
(by MITI 82~92)
Parallel Inference Machine
Expert system

Semantic Web
(Berners-Lee)

Watson
(IBM)

Dartmouth conference

SHRDLU
(Winograd 68)

Knowledge Graph
(Google 12)

Rule base / Symbolic manipulation / Inference Engine

1st AI

2nd AI

3rd AI

1960   70   80   90   2000   10   20

Data Driven / Pattern Recognition / Machine Learning

Real World Computing Partnership
(by MITI 92~02)

Perceptron
(Rosenblatt 57)

Back Propagation
(Rumelhart+ 86)

Bayesian Modeling

"Linear Separable"
(Minski & Papert 68)

Support Vector Machine
(Vapnik+ 92)

Deep Learning
(Hinton+ 06)

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3rd AI

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AI for changing industry

Deep Learning
(Hinton+ 06)

Machine

Bayesian Modeling

DL

深層学習
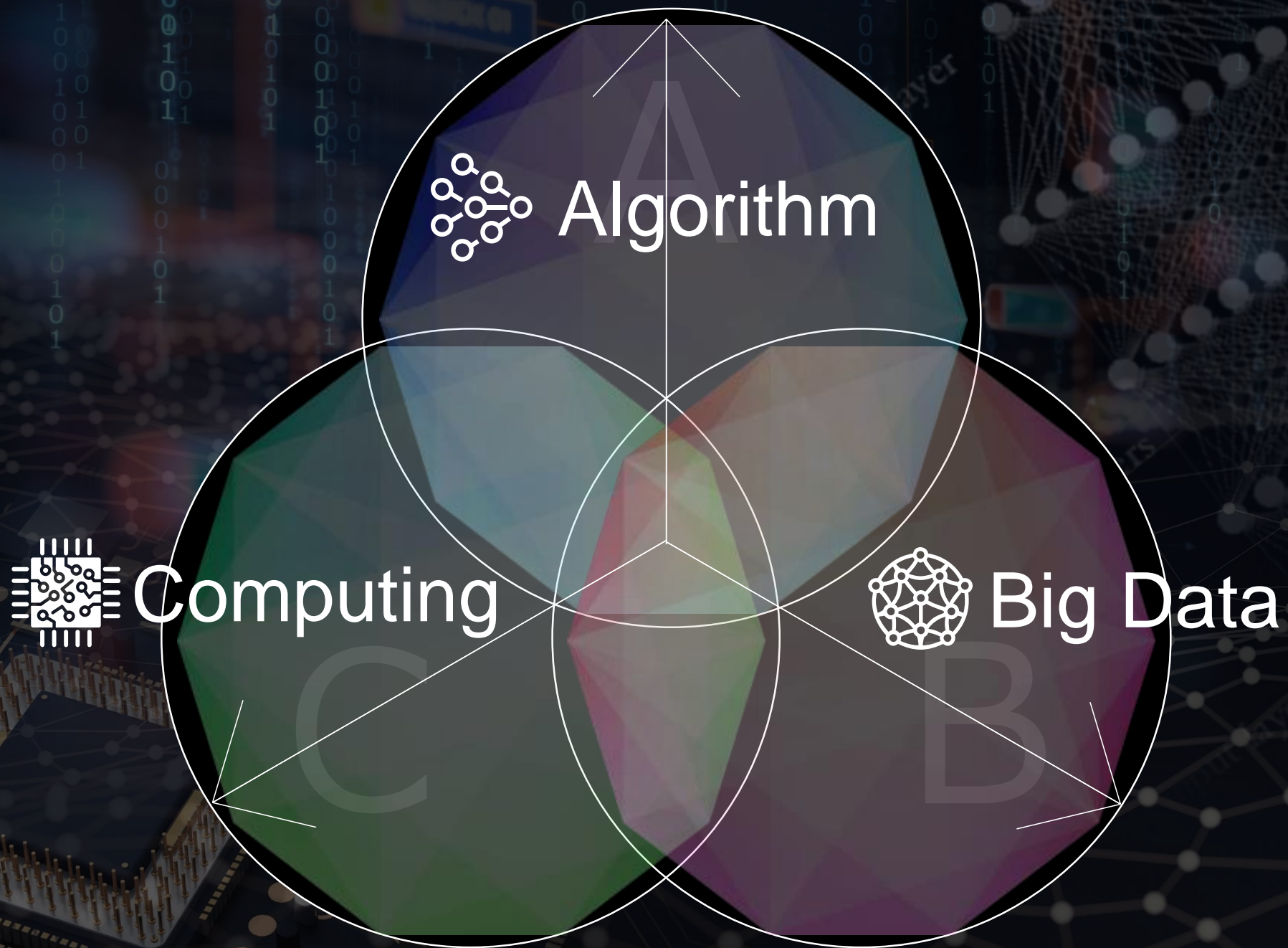
Chicken or Egg?
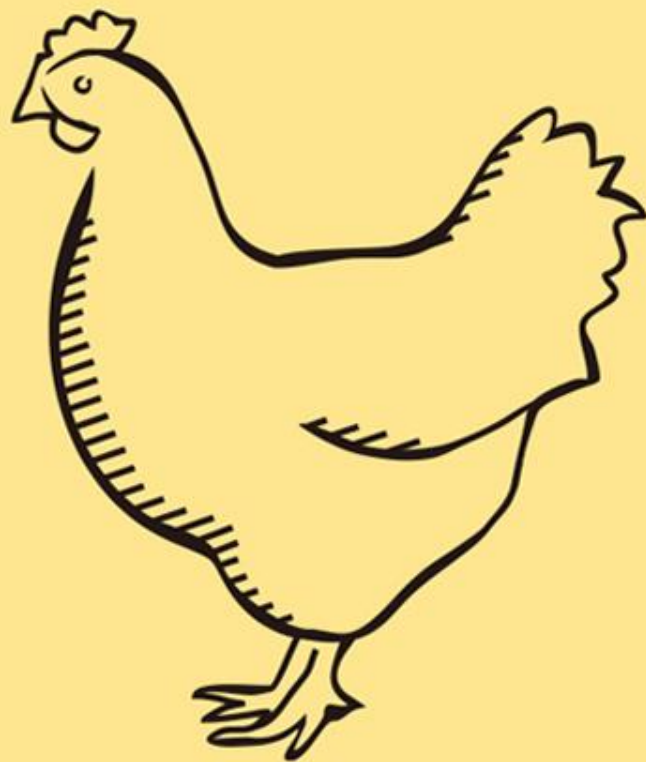
Huge Demand
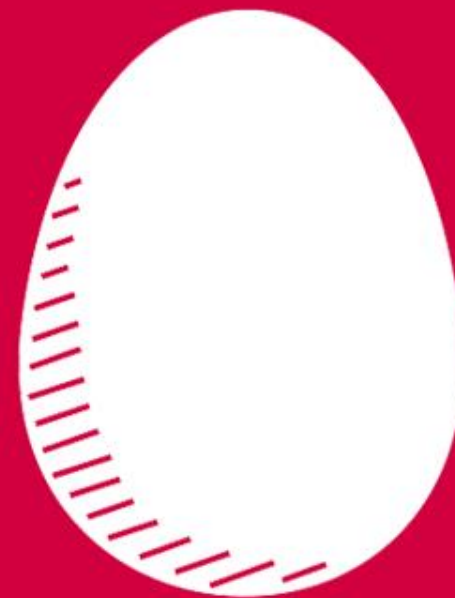
Limited Resources

Design: ABCI as the world's first large-scale OPEN AI Infrastructure

On Univ. Tokyo / Kashiwa II Campus

- 130~200 AI-Petaflops
- < 1.1 Avg. PUE

ABCI AI Bridging Cloud Infrastructure

- Top-Level SC compute & data capability
  - AI-Pflops 130~200 <
  - Power Budget < 3MW
  - PUE < 1.1

- Open Public & Dedicated infrastructure for AI & Big Data Algorithms, Software and Applications

- Platform to accelerate joint academic-industry R&D for AI in Japan

Operational before 2018 Q1

Rapid Construction < 6 month

Jan. 30th 2018

Dec. 2nd 2017

Oct. 30th 2017

ABCI: public AI-infrastructure for everyone

Expert

- Grand Challenge for leading-edge science
- Allow to use full capacity for 24hours

Advanced & Intermediate

- Software packages, sample data set, network
- AI for industry, customize application

Novice

- Ease of use for beginners
- Simple WebUI interface

Algorithm

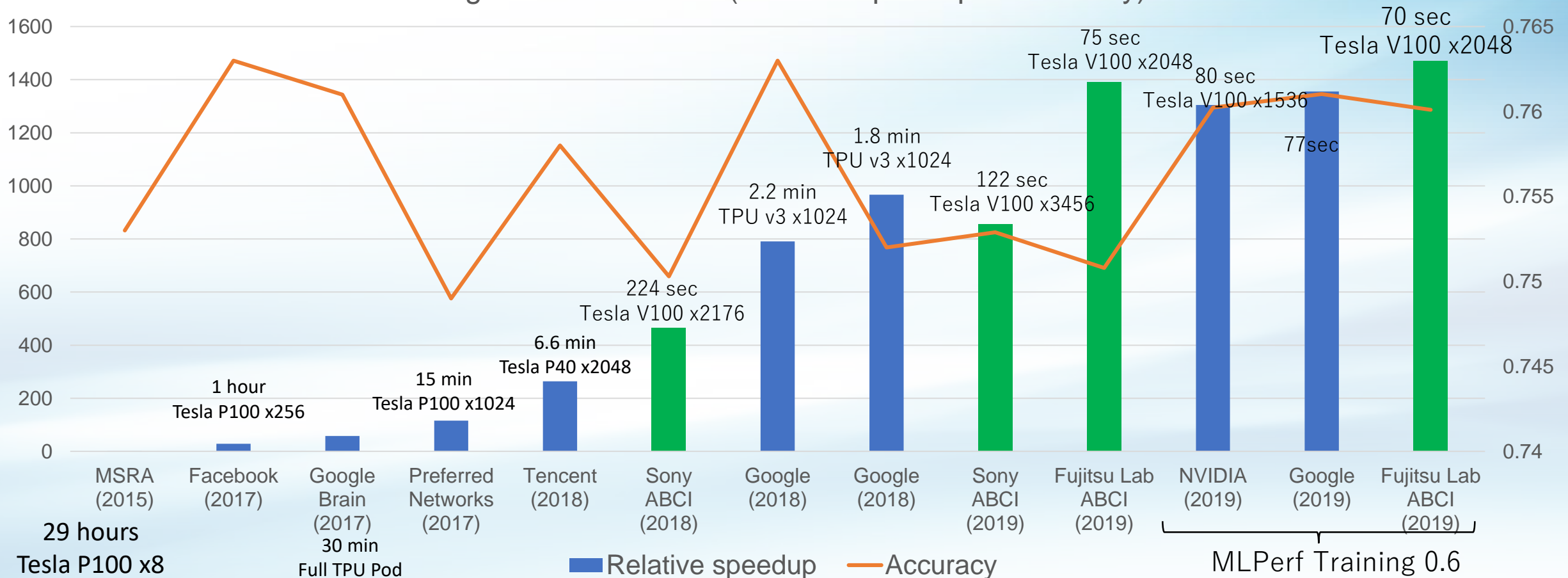Use cases and proportion of AI R&D

Computation

Big Data

- **Partnering Over hundred of Research Institutes, Universities, Industries**
- **Collaborating with Over thousand of research scientists, engineers, developers**

Grand Challenge Outcome

Fujitsu Lab., Sony and ABCI/AIST achieve "World's Fastest Deep Learning speeds through distributed learning"

ImageNet / ResNet-50 (Relative speedup & Accuracy)

Relative speedup — **Accuracy**

Data labels visible in chart:
- MSRA (2015): 29 hours Tesla P100 x8
- Facebook (2017): 1 hour Tesla P100 x256
- Google Brain (2017): 30 min Full TPU Pod
- Preferred Networks (2017): 15 min Tesla P100 x1024
- Tencent (2018): 6.6 min Tesla P40 x2048
- Sony ABCI (2018): 224 sec Tesla V100 x2176
- Google (2018): 2.2 min TPU v3 x1024
- Google (2018): 1.8 min TPU v3 x1024
- Sony ABCI (2019): 122 sec Tesla V100 x3456
- Fujitsu Lab ABCI (2019): 75 sec Tesla V100 x2048
- NVIDIA (2019): 80 sec Tesla V100 x1536
- Google (2019): 77 sec
- Fujitsu Lab ABCI (2019): 70 sec Tesla V100 x2048

MLPerf Training 0.6

ImageNet/ ResNet-50 are a widely-used data for image recognition and model for image recognition, respectively. We utilized the ImageNet data set and carried out learning of the ResNet-50 model.

GLOBIS-AQZ Project: Aiming to be the world's best Go AI and train younger players

Joint project including:
GLOBIS corp., Yamaguchi-san (ex-AIST famous Go AI developer), Nihon-Kiin (Japanese Professional Go Association), Triplize (Japanese start-up), AIST, and U-Tokyo

- AQ, the 2nd place in the last World AI Go Open, is being further strengthened using ABCI, and aiming to be the best in the world of Go AI
- After the tournament, the results will be made available openly and used to train younger players

Learning Day 1 vs Nakamura, 1st grade   https://abema.tv/channels/shogi/slots/Bwd1UYnNfezt1V

Learning Day 5 vs Shibano, 7th grade   https://abema.tv/channels/shogi/slots/ARbB2vVhrVBbUj

Thank you for your attention