Laying a Foundation for Joyful Learning

Keiwa College Academic Welcome Lecture for New Students

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Self-Introduction

Hiroshi Suzuki (Professor Emeritus, International Christian University)

- I taught mathematics and data science at university,
- was responsible for service learning, among other duties,
- and hosted weekly Bible gatherings in on-campus housing.
- I retired in March 2019 at the age of 65,
- and I now volunteer at a children's home, etc. while continuing to learn.

During High School Days

Campus Riot and the Christian Church

- In the fall of my first year of high school, a campus riot occurred.
  Some students, together with students from other schools, barricaded the area near the principal's office.
  After that, political issues and other topics were discussed daily.
  The riot police intervened, and classes were suspended for several months.
- Turning to the Christian church
  As divisions deepened among the students, I started attending church.
  There were many university students there, and I spent time with them, listened to what they had to say—feeling like I was trying to act grown-up. It was a time when my world suddenly expanded.

Words from Pastor Ryoichi Kato

"I want Japanese youth, rather than burning out their energy in confusion, to directly see Southeast Asia and have opportunities to interact with Asian people for the sake of the next generation."

At Honmoku Pier in Yokohama

53-Day Cargo Ship Journey in Southeast Asia

Living Together with the People of Asia

People I Met

- Many older people strongly disliked Japanese and held resentment.
- Some were envious of Japan's economic development.
- Everyone lived in very poor conditions.
- Children trying to make money by any means.
- Young women who had no choice but to provide sexual services to survive.

With a Sense of War Responsibility

- It felt important to live with a sense of responsibility, as someone sharing the same era.
- Even if we live in different worlds, we should remember these people, and strive to live in a way that we wouldn't be ashamed of before them.

University Days

What to Study

- Initially wanted to study physics and chemistry, hoping to contribute in Asia.
- At the time, most science programs did not accept color-blind individuals.
- Chose mathematics, which was unrelated to color vision.
- The mathematics program also required computer practice and computational theory—so I studied programming too.
- Gradually, I came to enjoy mathematics itself.

Mathematics or Social Work?

- I was invited to consider working in social welfare.
- Ultimately chose to pursue graduate studies in mathematics.

Later Journey of Living Together

Study Abroad and Employment

- Studied in the U.S. for about three years during graduate school.
- After returning to Japan, taught at a regional national university for 13 years.

At International Christian University

- Research and teaching in mathematics.
- Support for mathematical research in Asian universities[a].
- Student academic support and support for people with disabilities.
- Work camps in villages of hill tribes in Thailand.
- A program called "Service-Learning"
  Sent students to both domestic sites and abroad: China, Korea, the Philippines, Indonesia, Thailand, India, Kenya, and more.
- Discussion-based Bible groups.
- Work with child welfare facilities.

[a] Primarily in the Philippines and China

The Shock of AlphaGo

Chess, Shogi, Go: Humans vs. Computers

- **Chess**: In 1996, IBM's Deep Blue[a] defeated world champion Garry Kasparov.
- **Shogi**: Between 2012 and 2017, several AI (computer programs) emerged that even top professionals could not defeat.
- **Go**:
  - Originated in China, developed in Japan, now widely played in Korea, China, and loved by enthusiasts worldwide including Europe.
  - Though the rules are simple, mid-game position evaluation is difficult. It was long believed that AI could not surpass humans in Go.
  - In 2016, AI developed by Google DeepMind, led by Demis Hassabis, defeated Korean player Lee Sedol, who had been a world champion multiple times.

[a] a chess-playing expert system

Demis Hassabis

Background

- Born in London in 1976; father from Cyprus, mother from Singapore.
- Learned chess at age 4, led the UK junior team at world tournaments.
- Co-developed the simulation game *Theme Park* at age 17 and founded a company.
- Skipped two grades and studied computer science at Cambridge University.
- Earned a Ph.D. in neuroscience for research on the hippocampus.

Hopes for the Future of AI

What I'm really excited to use this kind of AI for is science, and advancing that faster. I'd like to see AI-assisted science where you have effectively AI research assistants that do a lot of the drudgery work and surface interesting articles, find structure in vast amounts of data, and then surface that to the human experts and scientists who can make quicker breakthroughs.[a]

[a] Article: `https://www.theverge.com/2016/3/10/11192774/demis-hassabis-interview-alphago-google-deepmind-ai`

What Came After AlphaGo

Improved Versions

- **AlphaGo (2016)**: Defeated top human Go players.
- **AlphaGo Zero (2017)**: Defeated AlphaGo without using human game records.
- **AlphaZero (2017)**: Mastered perfect information games such as chess, shogi, Go, Othello, and Atari.
- **MuZero (2019)**: Learned both how to play and the rules of perfect information games.

Strengths of DeepMind AI (Personal View)

- **Generality**: A first step toward AGI (Artificial General Intelligence).
- **Self-learning**: Uses deep reinforcement learning.

From Teaching to Learning

From Teaching to Learning

- In educational theory: "From education to learning"
- University education reform (2000s): "From teacher-centered to student-centered universities"
  The effectiveness of teaching should be assessed by how well students learn.

Recent Go Scene

- Today's top-level players are stronger than AlphaGo, which defeated Lee Sedol.
- The latest AI is so strong that it's hard to understand why it makes certain moves, even after thorough analysis.

After retirement, I resolved to study AI and data science

Advances in Artificial Intelligence

2024 Nobel Prize: https://www.nobelprize.org

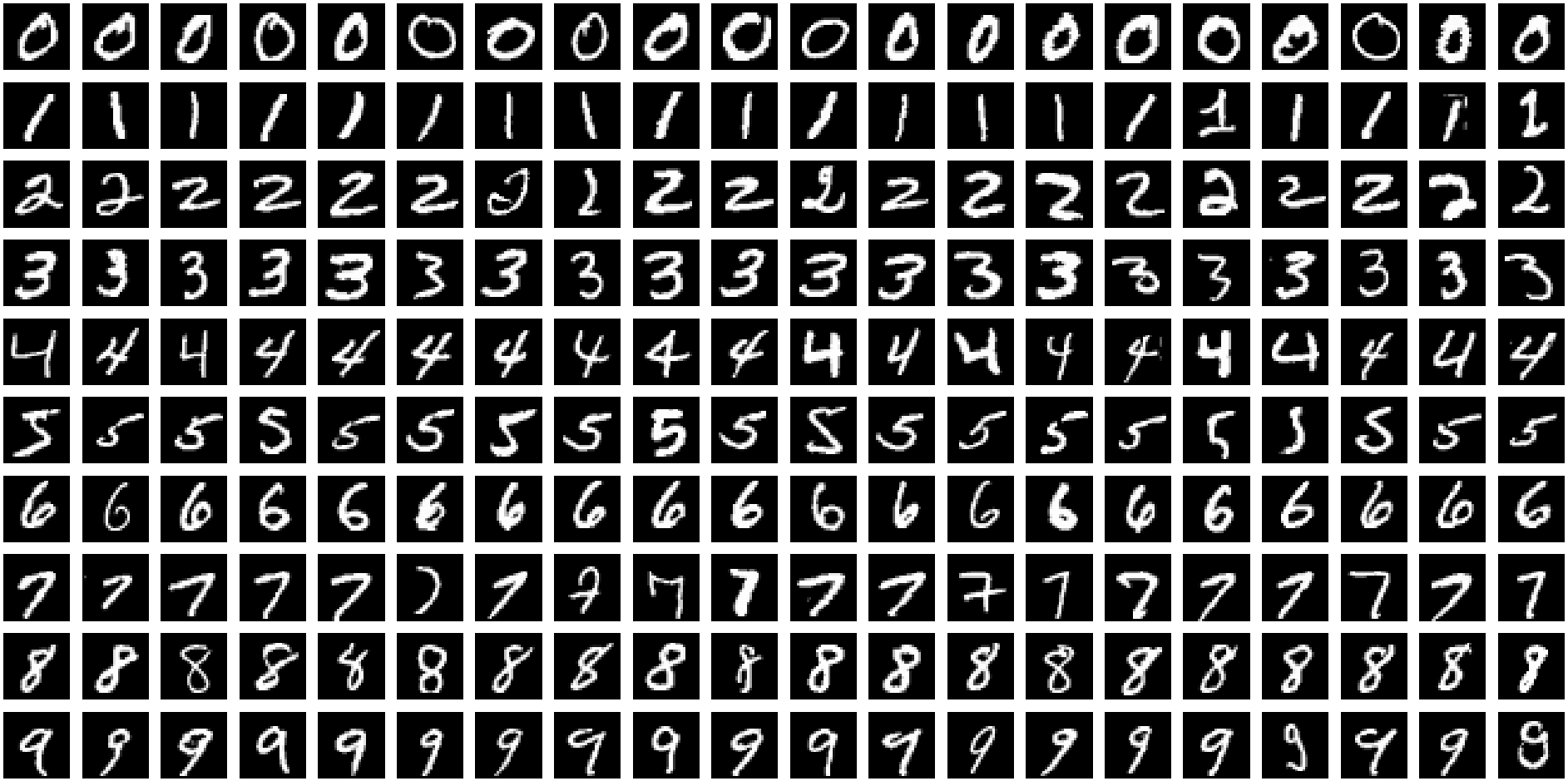
- **Nobel Prize in Physics**[a]:
  - Geoffrey Hinton
  - John J. Hopfield
- **Nobel Prize in Chemistry**[b]:
  - David Baker
  - Demis Hassabis
  - John Jumper

[a] https://www.nobelprize.org/prizes/physics/2024/summary/
[b] https://www.nobelprize.org/prizes/chemistry/2024/summary/

Physics and Chemistry Prizes

All five laureates received awards for AI-related research.

Achieving Human-Level Performance on MNIST



Automated recognition using MNIST data labeled with human-identified handwritten digits.

Progress Toward AGI

Image Recognition and Generation

- Achieved human-level performance on MNIST recognition using neural networks (around 2013)
- Image classification by face with Google Photos
  Facial recognition is now used in airport immigration and national ID health insurance systems
- Image and video generation became prominent (around 2021–2022)

Revolution in Natural Language Processing (NLP)

- Transformer (Attention Is All You Need, 2017)
- BERT (Bidirectional Encoder Representations from Transformers, 2018)
- Multilingual automatic translation became possible
- GPT (Generative Pretrained Transformer) series
- AI that responds in natural language is called LLM (Large Language Model)
- Recognition of programming languages and code generation from natural language

Progress Toward AGI (continued)

Reinforcement Learning

- AlphaGo (2016), AlphaGo Zero (2017), AlphaZero (2017), MuZero (2019)
- In dynamic environments, AI began learning autonomously. Initially guided by human-provided data and reasoning, AI now learns on its own and even teaches humans.
- Complex applications still require enormous computational resources and energy.
- More efficient, smarter ways of learning are needed.

Expanding Real-World Applications

- Self-driving cars, FinTech, robotics, etc.
- Protein structure prediction using AlphaFold 2 (Nobel Prize in Chemistry: Demis Hassabis, John Jumper)
- New protein synthesis using AlphaFold database: Fold.it[a] (David Baker)

[a] `https://fold.it`

How to Engage with AI, and What the Risks Are

Basic Thinking

- Geoffrey Hinton left Google, warning that AI could one day dominate humans.
- Discussions about what AI cannot do (compared to humans) are now unproductive.
- AI's usefulness is being validated across fields—stopping it may be inappropriate.

Risks

- We don't fully understand what is dangerous.
- **Dual-use** concerns:
  - The Haber-Bosch process enabled synthetic nitrogen fertilizers (agricultural revolution), but also led to the creation of powerful bombs.
  - Pesticides developed for agriculture were adapted into chemical weapons.
- There may be a need for international agreements.

Rather than just what is right, I need to think what we value and how we live.

From the Bible

1 Corinthians 13:13

And now these three remain: faith, hope and love. But the greatest of these is love. (NIV)

Love, Faith, and Hope

- Love: Welcoming those who are difficult or troublesome to accept[ab]
- Faith: Living together with the phrase, "Please tell me about yourself," and nurturing a relationship of trust
- Hope: Pursuing fairness, reaching agreements, and cooperating to make things happen together

[a] Perhaps we are also being supported by someone who accepts us in that same way.
[b] Do not overextend yourself. Healing takes time. Sometimes taking some distance for a while is necessary.

What is more important than being right?

Learning and AI

Changes in Learning

- The learner remains at the center.
- AI supports the learning process by providing necessary knowledge, thought-provoking questions, and helpful advice tailored to each learner at the right time (personalized learning).
  - This is gradually becoming a reality.
  - AI can offer what is known to be necessary in each situation.
- What then is the role of peers and teachers?

Challenge: Deeper Understanding of Learning

- Why a person cannot understand something—their pain, struggle, sorrow, and joy—can be very difficult for AI to grasp.
- We should utilize AI analyses and work together to deepen human understanding of what is needed.
  A person's past, present, and future experiences of pain, sorrow, suffering, and joy form their irreplaceable identity and dignity.

Even if Generally Useful, Can We Truly Be Happy?

Opening of 'Anna Karenina' by Leo Tolstoy

All happy families are alike; each unhappy family is unhappy in its own way.

Anna Karenina Principle (AKP)

- Happiness results when multiple conditions are fulfilled. Unhappiness arises when even one of those conditions is missing.
- Because unhappiness stems from missing conditions for happiness, its forms are diverse. Even if few people are unhappy, addressing each person's situation is very difficult.
- Assuming things are okay because they usually work out is careless. The reasons for failure vary, as do the pains, and we must be willing to receive and respond to them.

My Treasures

Encounters with Diverse People

- People with whom I clashed during campus protests.
- Friends and people I met while traveling in Southeast Asia.
- At university, in a children's home, in facilities supporting people with disabilities—not only in Japan but around the world—and all of you here today.

Please cherish your encounters!

When You Don't Know What's Right

- (Though a conclusion may not be reached) Please value the diverse thoughts and opinions of different people—including those represented by AI[a]—and seek ways to live together.
- (Even if it's troublesome) Listen to people from different backgrounds.
  - Try asking someone from a different generation.
  - People with disabilities or serious illnesses.

Everyone is different, everyone is valuable

Everyone is Different, Everyone is Valuable

"Me and the Little Bird and the Bell" by Misuzu Kaneko

Even if I spread out both my arms, I can't fly through the sky at all,

But the little bird that can fly Can't run fast on the ground like I can.

Even if I shake my body, I can't make a beautiful sound,

But the ringing bell can't Sing many songs like I do.

The bell, the little bird, and me—

We're all different and all wonderful.

Learning at Keiwa College, a Liberal Arts University

Learning in the Liberal Arts (My View)

- I see it as education that nurtures global citizens who live in various contexts.
- I don't know where or how each of you will work in the future, but I hope you will enjoy learning while developing other-centered perspectives, and build a foundation to become global citizens among diverse people.

Joyful and Vibrant Living

- I hope you will live joyfully and vibrantly—without reducing your daily life to mere routine.
- Work hard, cooperate, and receive support from many diverse people.
- I pray that each of your days will be fulfilling.

Why Not Try Using AI?

Poe (URL: `https://poe.com`)

- Available on the web, mobile apps, and PC apps.
- You can use most public AIs such as ChatGPT, Google Gemini, and Perplexity.

Duolingo (URL: `https://www.duolingo.com`)

- Available on the web, mobile apps, and PC apps.
- From Japanese: English, Chinese, Korean, French, German, Italian, Spanish, and elementary-level math.
- From English: About 40 languages, as well as math and music.
- Mission: To develop the best education in the world and make it universally available.

Note

Please follow (university and class) rules and use AI wisely and enjoyably.

Thank You for Listening!

Suzuki's HP

Slides [PDF]