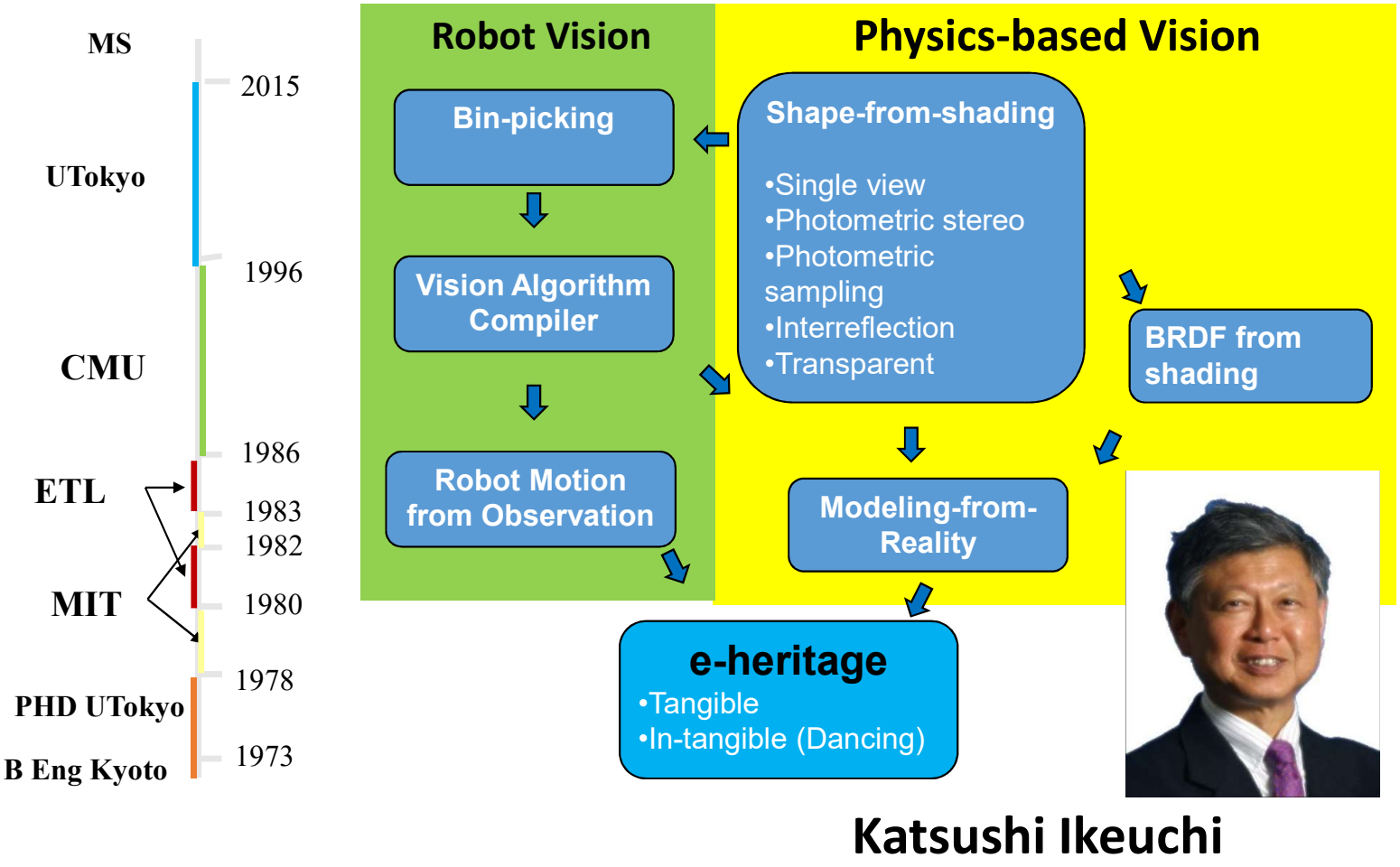
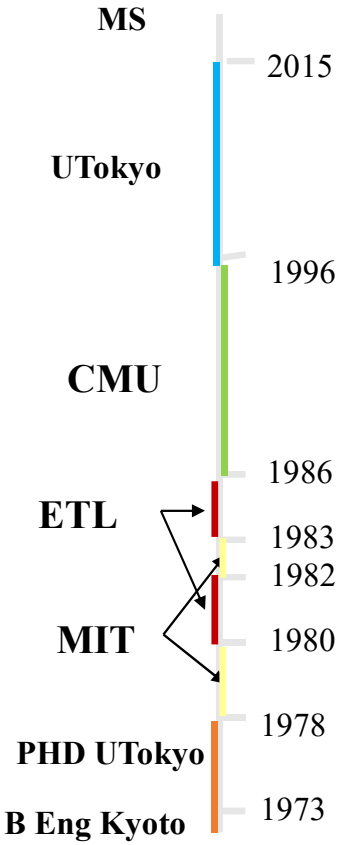
Rights & Obligations

Katsushi Ikeuchi
Microsoft

Who the hell is this guy?

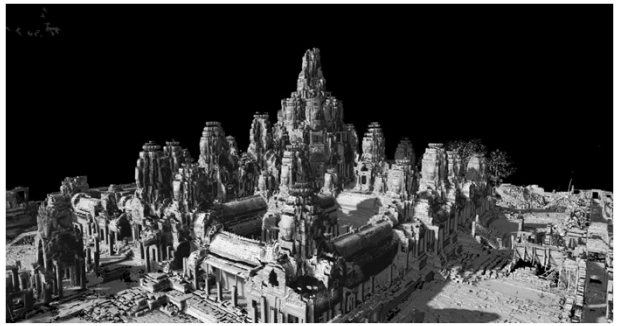


Katsushi Ikeuchi



- **Okawa foundation**
  Okawa award
- **Funai foundation**
  Funai award

- **Japanese Emperor**
  Medal of Honor with Purple Ribbon
- **IEEE-PAMI**
  Distinguished Researcher Award



e-heritage
- Tangible
- In-tangible (Dancing)

Community service

- **General chairs:**
  - **IROS1995, ITSC1999, IV2001, ACCV2007, ICCV2017**

- **Program chairs:**
  - **CVPR1996, ACCV2000, ICCCV2003, IV2005, ICRA 2009, ICCV2015**

- **Editor-in-Chief:**
  - **International Journal of Computer Vision, Nov 2001-Jan 2017**
  - **International Journal of ITS Research, Jan 2003-Jan 2009**

- **AC – many times**
  - **SA 2015; ITSW2015, 3DV2009,IROS2008, ICRA2008, OTCBV2008, MVA2008, ICMV2007, IROS2007, OTCBVS2007, ITSW2006, IROS2006, ITSW2005, ICRA2005, CVPR2005, ICCV2005, 3DIM2005, MVA2005, ITSW2004, CVPR2004, IROS2004, ICRA2004, MVA2004, OTCBVS2004, ITSW2003, IROS2003, ICRA2003, ICCS2003, IV2003, ACVA2003, ICRA2003, 3DIM2003, ITSW2002, IROS2002, ICRA2002, ISMAR2002, CVPR2002, MVA2002, ICPR2002, SI2002, ITSW2001, ICCV2001, ICRA2001 ISMR2001, ITSW2000, CVPR2000, ICRA2000, ITSC2000, ACCV2000, IVS2000, IROS2000, ITSW1999, CVPR1999, SIGGRAPH1999, ICCV1999, IROS1999, WACV1998, CVPR1998, ACCV1998, IROS1998, MIRU1998, MVA1998, WPBV1995, ICPR1994, IROS1994, ICCV1993, CVPR1993, WACW1992, WCAD1991, CVPR1991, ICCV1990,…….**

Rights & Obligations

Rights

- To do any research
- To attend any conference
- To submit your papers to any conference or journal

Obligations: to maintain the community

- **Being a volunteer to run such conferences**
- **Being a good reviewer and a good AC**
- **In particular, one paper needs a couple of reviewers, typically three reviewers**
- **Namely, once you submit one paper, you have an obligation to review *at least* three papers**

Reviewing is voting

- Reviewing is a serious business
  - To decide rejection or acceptance
    - You should be fair and objective

- Voting to decide:

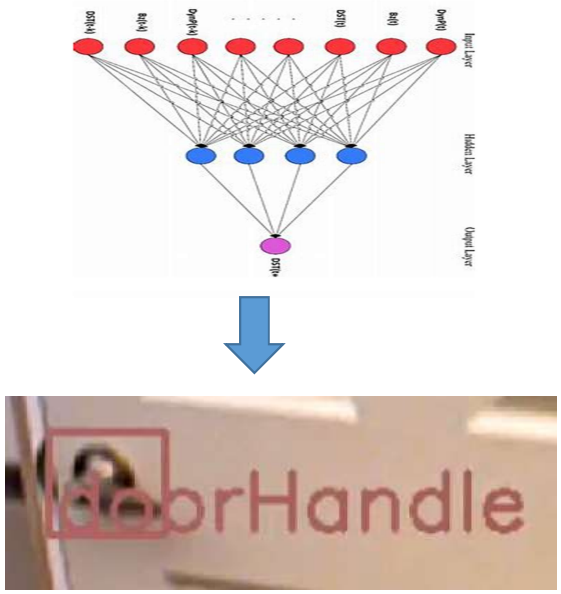
  - characteristic of the community

  - Solid growth of the community

What do we need for solid reviewing?

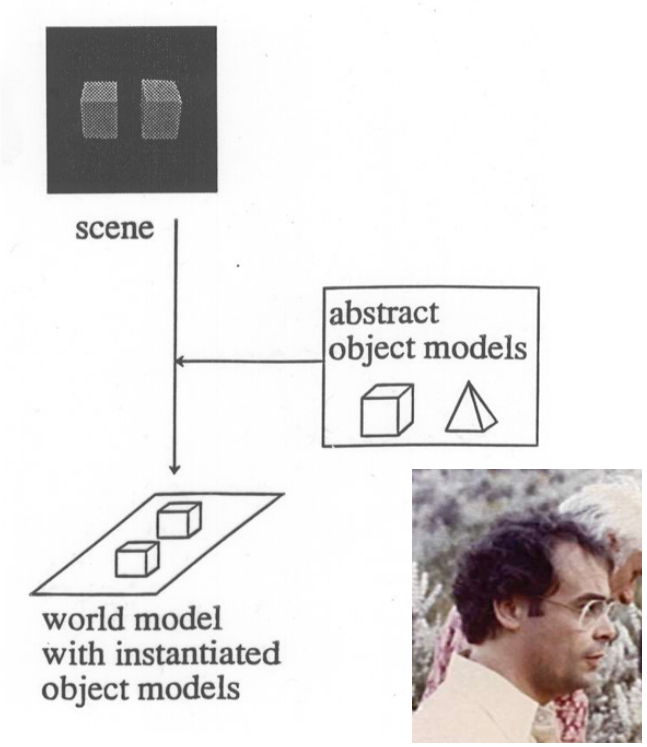
Two kinds of papers: inlier/outlier

- Inlier papers
  - For example, an object recognition paper, using a well known database
  - it is relatively easy by just comparing the performance with other current papers
  - need to have fair attitude, however
- An example of an inlier object recognition paper



Outlier papers

- **Outlier example**
  - **generate a copy of the world**



- **Evolution shows such outliers are the key components for the community to grow**
- **For example, one paper, currently cited more than 50000 times, rejected twice from ICCV and CVPR due to its outlier characteristics**
- **We need special care for such outlier papers**

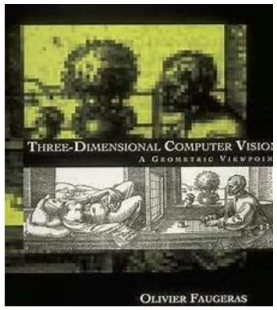
Then, how to handle outlier papers

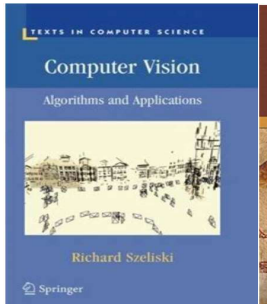
- **Need judgement based on solid knowledge:**
  - **What we have**
  - **From where we come**
  - **To where we go**

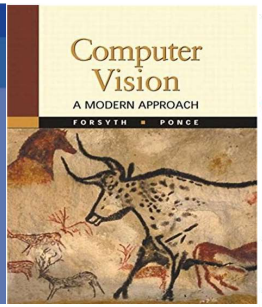
what do we have

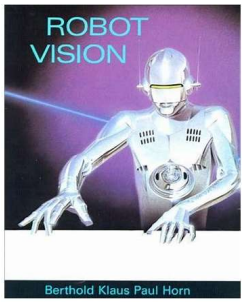
Two class of knowledge reservoirs to know what we have

- **Dictatorship type: Text book**
  - **the author decides the content**
  - **the author writes the contents**
  - **The author conveys his/her views and perspectives through the book**









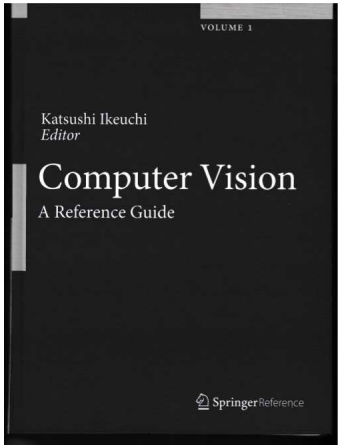
Geometry first ⟷ Photometry first

→ read at least two textbooks for fair views what we have

Democratic type: Encyclopedia

- the community decides the content
- the community writes the contents
- The community maintains it through thecommunity effort

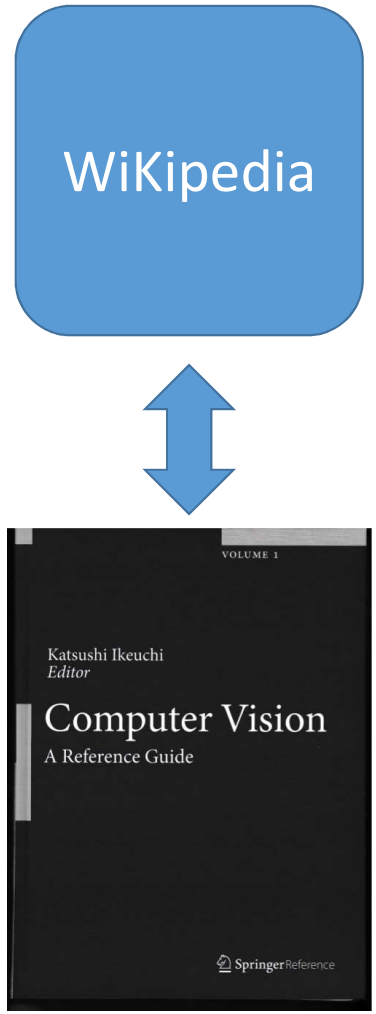
WiKipedia



Wikipedia or CV reference book

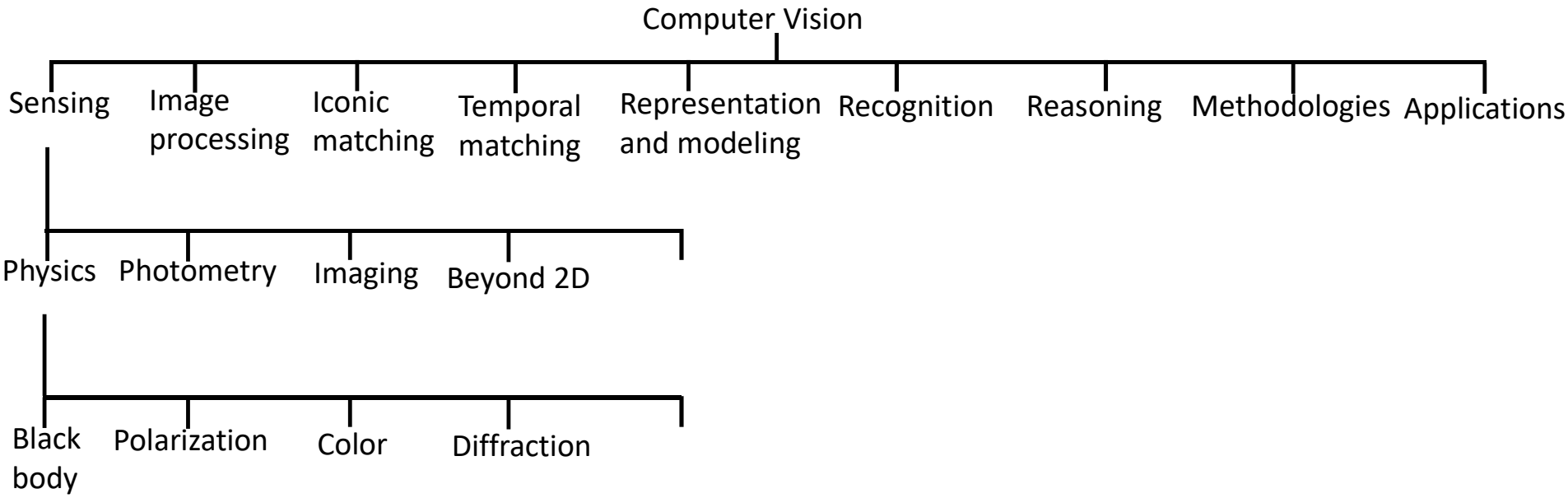
- **Wikipedia**
  - **a random collection of topics**
  - **Anyone can write anything**
  - **Too democratic!**

- **CV ref-book**
  - **IJCV community determines topics**
  - **IJCV community determines authors**
  - **The contents are guaranteed by IJCV community**



IJCV – CV ref book

- **A collection of survey articles**
- **CV Taxonomy has been decided by senior editors of IJCV**

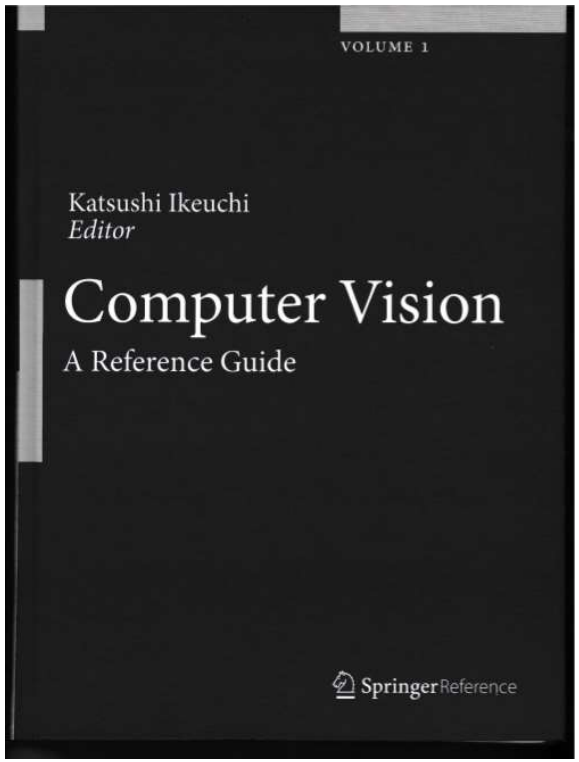


Community effort

- Conference format
  - Area editors are assigned by senior editors
  - Authors are assigned by area editors
  - Articles are reviewed by area editors

- We are going to revise this:

- **Please join this community effort for maintaining our solid foundations**



From where does this community come?

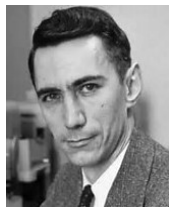
The Big bang:

- The ***Dartmouth conference*** in 1956


McCarty


Minsky


Rochester


Shannon

...

- ***Computer vision, Robotics, AI*** were all synonyms

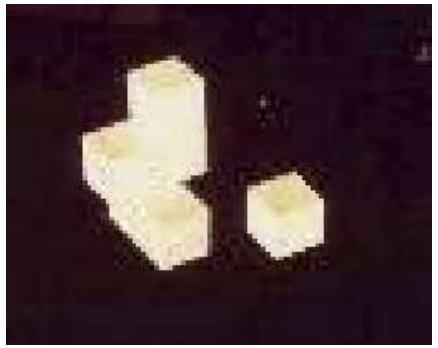
- In fact, the artificial intelligence laboratory, MIT, one of a few AI center at that time, completed the following demos:

Copy Demo:

one representative demo@The AI Lab, MIT

15 years after the Dartmouth

- **Sensing : to watch the block world**
- **Cognition : to understand the structure**
- **Action : to create the same structure**



Target scene

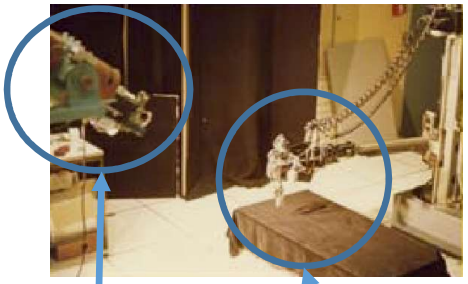


Image dissector for sensing

Manipulator for action

Binford (S)

Winston (C)

Horn (A,S)

Minsky

Bin-picking Demo: Another demo @The AI Lab, MIT

25 years after the Dartmouth

- **Sensing**:

  photometric stereo

- **Cognition**:

  Extended Gaussian Image

  (orientation histogram)

- **Action**:

  obtained configuration **and pre-determined** ***grasp plan***

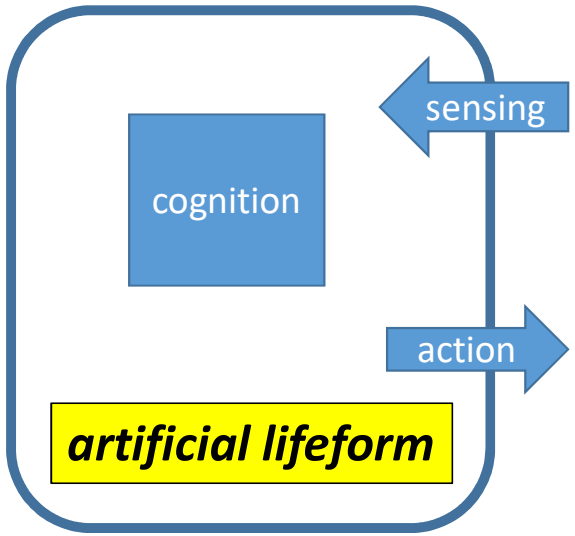
Horn & Ikeuchi *Scientific American 84*

Me

The goal of AI (Robotics and CV) at that time

- To create an ***artificial lifeform*** with the three components:
  - *Sensing*
  - *Cognition*
  - *Action*

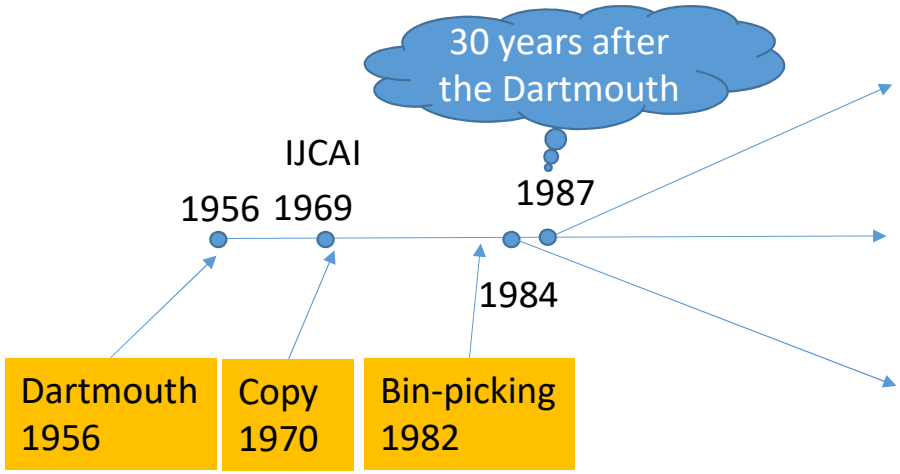
- The demos aim
  - ***Automatic*** and ***autonomous*** systems
  - ***Static environment*** without human intervention and human interaction



The three components contain challenges

Reductionism!

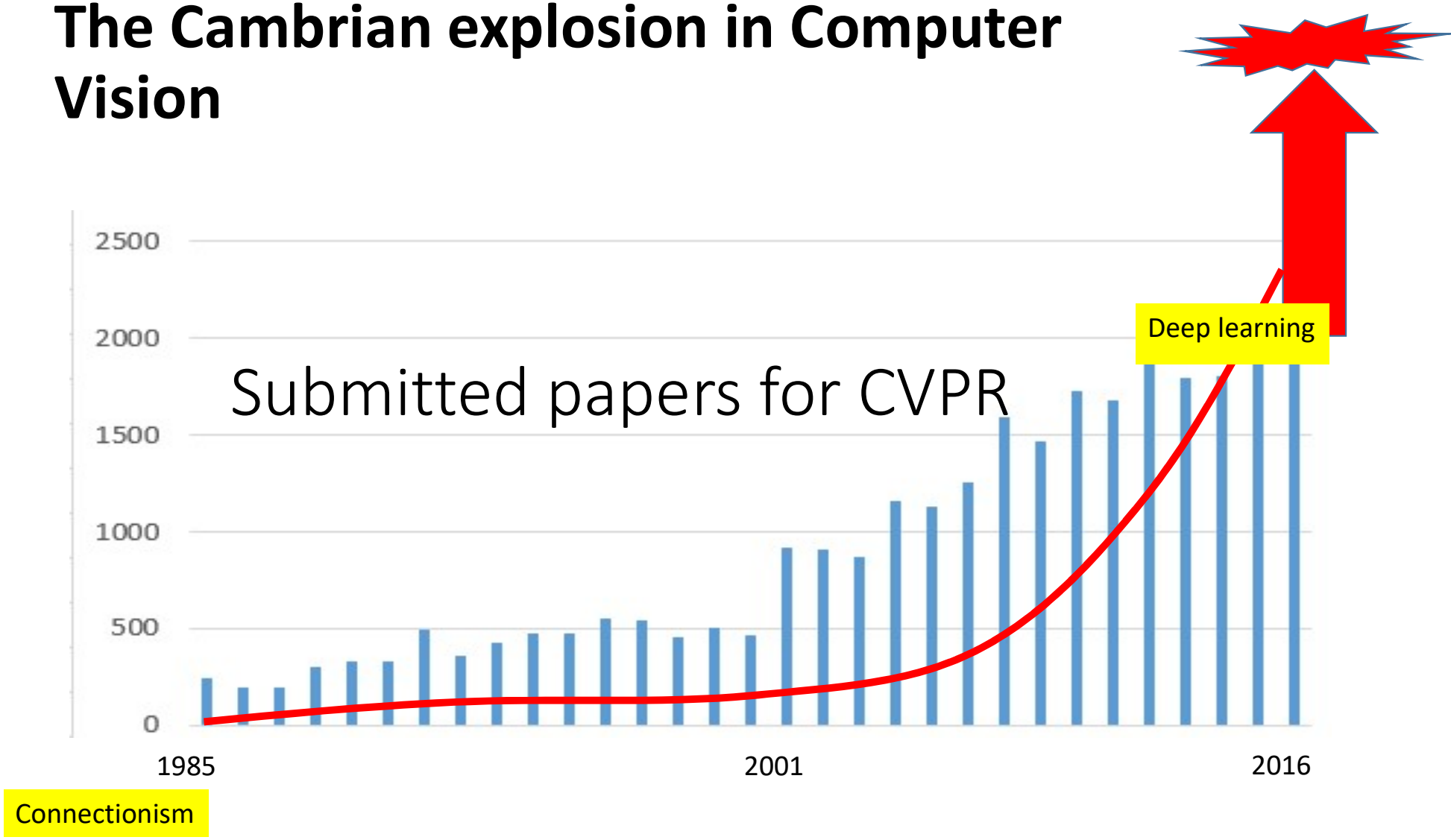
- System -> component
- Divide-and-conquer



- **Sensing** **-> computer vision**
- **Cognition** **-> core artificial intelligence**
- **Action** **-> robotics**

To where does this community go?

The Cambrian explosion in Computer Vision



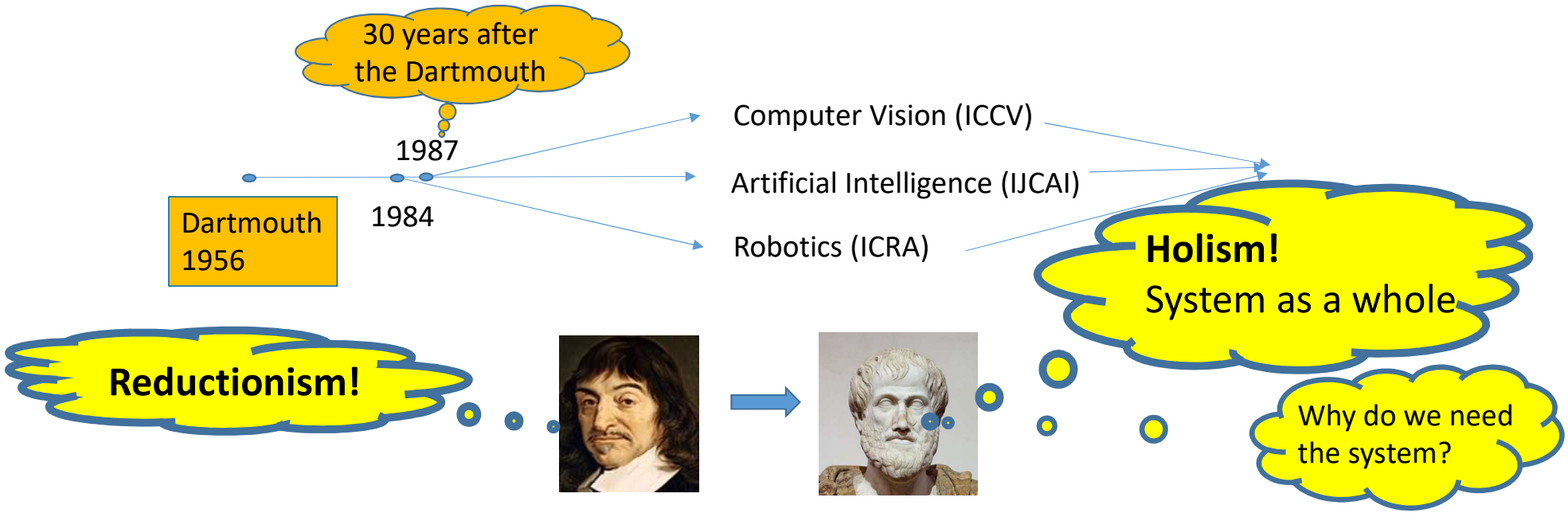
Explosion and extinction

- **Explosion**
  - **Biology: acquisition of vision**
  - **This community: acquisition of DNN techniques**
- **Extinction**
  - **Too many species**
  - **Most species were extinct**
  - **Only those optimize to the environment can avoid extinction**

To avoid extinction: need paradigm shift

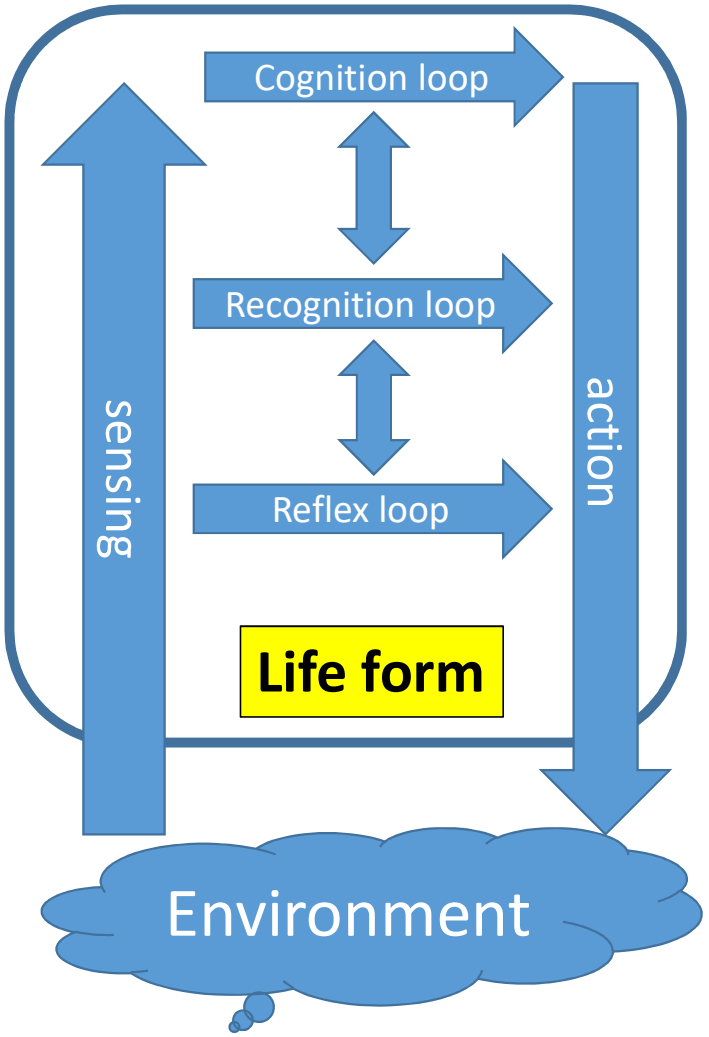
- Too much reductionism -> disciplines are too fragmented

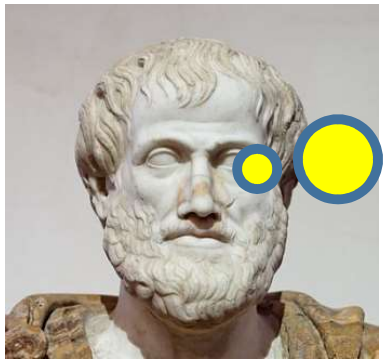
- To introduce Holism approach to foresee as a system with adaptation



Artificial life form and Holism

- **Systems to adapt the environment**
- **Architecture to react in different response time inspired by biological systems**
  - **Multiple layers**
    - **Local loop** for quick relaxions such as obstacle avoidance
    - **Edge loop** for local intelligence such as manipulation and navigation
    - **Cloud loop** for cognitive tasks such as human-robot interaction
- **Interaction among systems and layers**



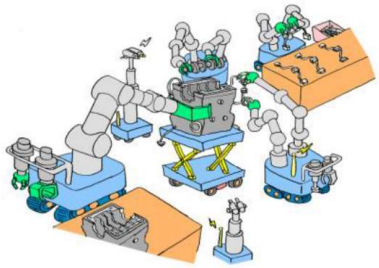


- **The current system is just a composition of components**
- **The system is not optimized for the environment**

-> Define the environment!

Environments = Application areas

- Industrial (indoor/clean/pre-arrangable)
  - Assembly/Disassembly of industrial products
  - Logistics – sorting objects and picking-placing products



- Field (outdoor/random/un-expectable)
  - Plant disaster response
  - Tunnel disaster response
  - Defense response

- Service (indoor-outdoor/random/human)
  - Home service
  - Enterprise service

The system should be adapted to the environment

- **Definition of the environment**

- **Under this environment**
  - **Why we need such components**
  - **Is the component optimized to the environment**
  - **In one sense, to revisit *Task oriented vision* (*Ikeuchi&Hebert96*)**

- **Is such optimization enough to build an artificial lifeform?**

→ NO

- **Does any DNN want to learn?**

  NO : ***None of the DNN systems want to learn for themselves.***

  Simply, human programmers (you) prepare them for their learning

- **Does any DNN system have self-consciousness?**

  NO : ***None of the systems have self-consciousness***

Lifeform exists for soul

I think, therefore I am

Lifeform exists for soul

I think, therefore I am

- If the goal is to build artificial lifeforms, we should aim to design ***artificial souls with self-consciousness***

- Then, is it a good idea to design artificial souls?

  YES : ***We need artificial souls for systems to collaborate***

Two types of artificial souls

Terminator type soul*:*

Enemy concept

- **To compete and replace human**
- **Complete automatic and autonomous system**
- **Autonomous intelligence**

Doraemon type soul*:*

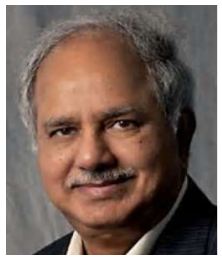
Friend concept

- **To cooperate and help the human**
- **Augmenting human physical and intellectual ability**
- **Augmented intelligence**

Artificial Souls for human friendly artificial lifeform

- **Artificial lifeforms (AL) should be friends of human**
- **Human is the master and the creator of ALs**
- **AL and human should cooperate with each other**
- **AL should not aim at *Autonomous Intelligence*, but should aim at *Augmented Intelligence (90% AI)***

Reddy *personal communication 2017*



Summary: to be a solid member of the community

- You have rights to submit papers
- You have obligations to create solid reviews
- You have to know what we have
- You have to know from where we come
- You have to know to where we go