

Some Thoughts about Career Developments in Industry

A Personal View

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數學沙龍與生涯探索 (Last modified: 2017/11/24)

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<http://slido.com>

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JOIN

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Thinking

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100 Years of Fashion

不同時代的穿著，反應不同時代的思維與價值觀



基因演化 vs 文化演化

人的實體變化很慢，**思維**可以短時間改變
例如，從君權神授到主權在民

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How Do I Think?

Context

...

- Nano
- Big data
- AI

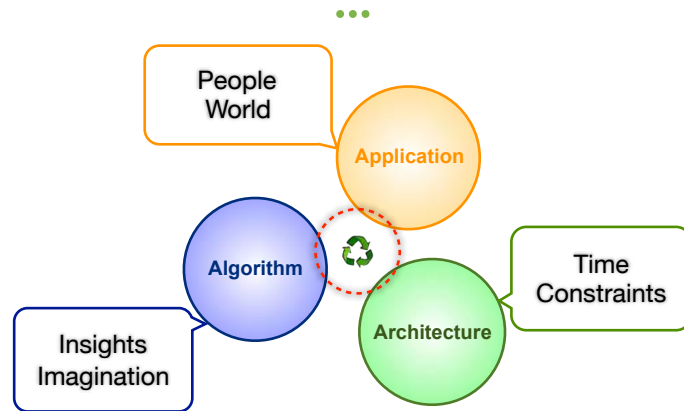
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A good hockey player plays where the puck is.
A great hockey player plays where the puck is going to be.
— Wayne Gretzky

Context

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Example 1

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Boeing 787 Dreamliner

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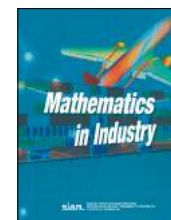
- Dynamic wings
- Efficient & robust engines
- Composite materials
- Integration & customization



Applied Mathematics in 787

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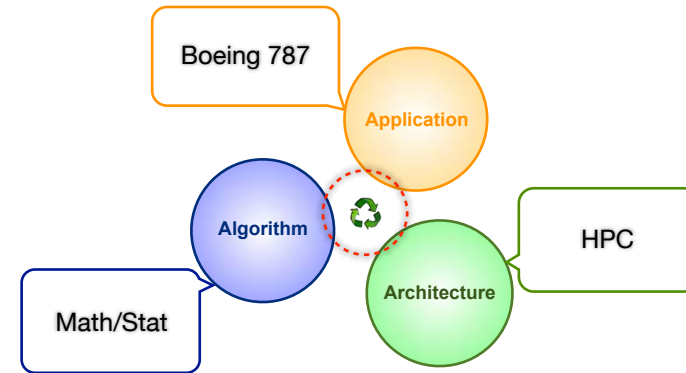
- Numerical linear algebra
- Differential equations
- Operations research
- Computational geometry
- Optimization
- Optimal control
- Statistics
- Data management



High-Performance Computing in 787

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- Entirely designed on computers



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Example 2

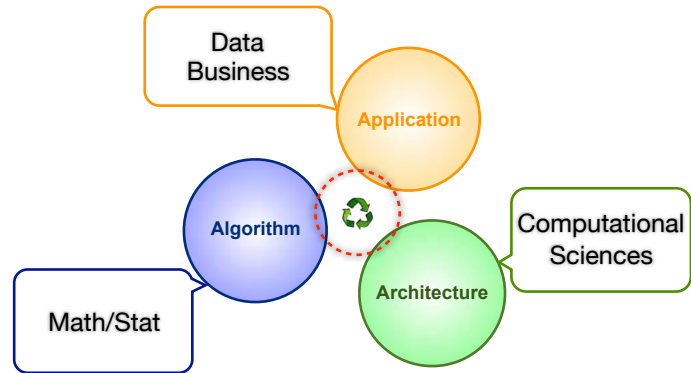
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陳嘉宏

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- Data scientist @ Rakuten, Japan
- Interdisciplinary
- Internation
- Industry





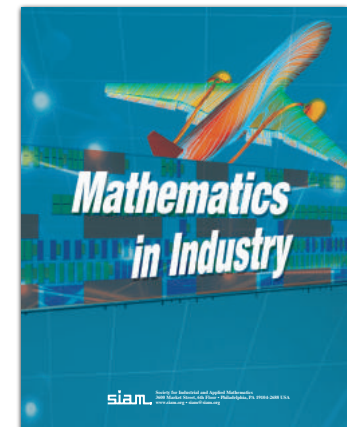
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What Do Others Think?

Example 1

SIAM Report on Mathematics in Industry, 2012

- Economy changes from manufacturing-based to service-based
- Industries hiring mathematical and computational scientists
- Student preparations



Qualifications and Skills

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- “T-shape” profile
 - breadth of knowledge across the mathematical and computational sciences
 - technical depth in a relevant discipline
- Interest/experience/enthusiasm for varied challenges or the scientific or business focuses

Technical Skills that Graduates Need

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- Mathematics
 - board in core courses & depth in specialty
- Computation
 - Programming & high-performance computing
- Application and real-world problem solving
 - Language of domain & bridging the gap

Graduate Student Education

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- Graduate-level training outside of their major

Training in another discipline	
	%
programming	65
scientific computing	35
other computer science	28
scientific discipline	58
business discipline	29
engineering discipline	9
other discipline	4

Table 9: Percent of respondents with training in another discipline

Essential to Annual Review

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Essential/important to annual review

	%
mathematical models	67
software development	43
presentations to management	64
preparation of internal reports	59
presentations to customers	53
presentations at conferences	39
publication in the open literature	29

Table 8: Percent of respondents rating task outcomes as essential or important for their review

Communication and Teamwork

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- It is not enough to have a good idea; they need to sell it in a language management will understand
- Flexibility and communications skills required to work in an interdisciplinary team
- The discipline to meet time constraints
- Sense for a reasonable solution

Example 2

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J. P. Morgan, 2017

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- Rajesh Krishnamachari, Vice President of Quantitative and Derivatives Strategy, J.P. Morgan
- “Our team has PhDs in different disciplines – there are a couple with
 - **PhDs in applied math**, who work on computational **geometric** algorithms,
 - **PhDs [in computer science]** with the **deep-learning** skills we’re trying to enhance on, and
 - **PhDs in statistics**, who apply **classical mathematical techniques** to writing algorithms,”

• <https://news.efinancialcareers.com/us-en/297540/j-p-morgan-wants-to-hire-phds-who-can-master-machine-learning-and-markets>

Rajesh Krishnamachari

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Rajesh Krishnamachari

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- “Rigorous mathematics might **not** lead you to the right answer, so even when you hire people with the backgrounds I mentioned, you have to make sure they have the **right markets intuition.**”

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What Can You Do?

Find Your Passion!

infinity and beyond
超越無限



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Thank you.

Questions/comments/collaborations are welcome!