The Art of Reading

How do I get the most out of this research paper?

Aaron Stump
Computer Science
The University of Iowa

Coffee and Conversations, Computer Science Dept., Nov. 14, 2018

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Add your own!

Yes! (Reading is important)

- As educated people, read on many topics (history, culture, etc.)

- As researchers, we need to read **papers**
  - Learn!
  - Advanced material rarely in textbooks
  - Be able to cite previous related work
  - Reading code can also be good – but papers key

- But we cannot know everything...

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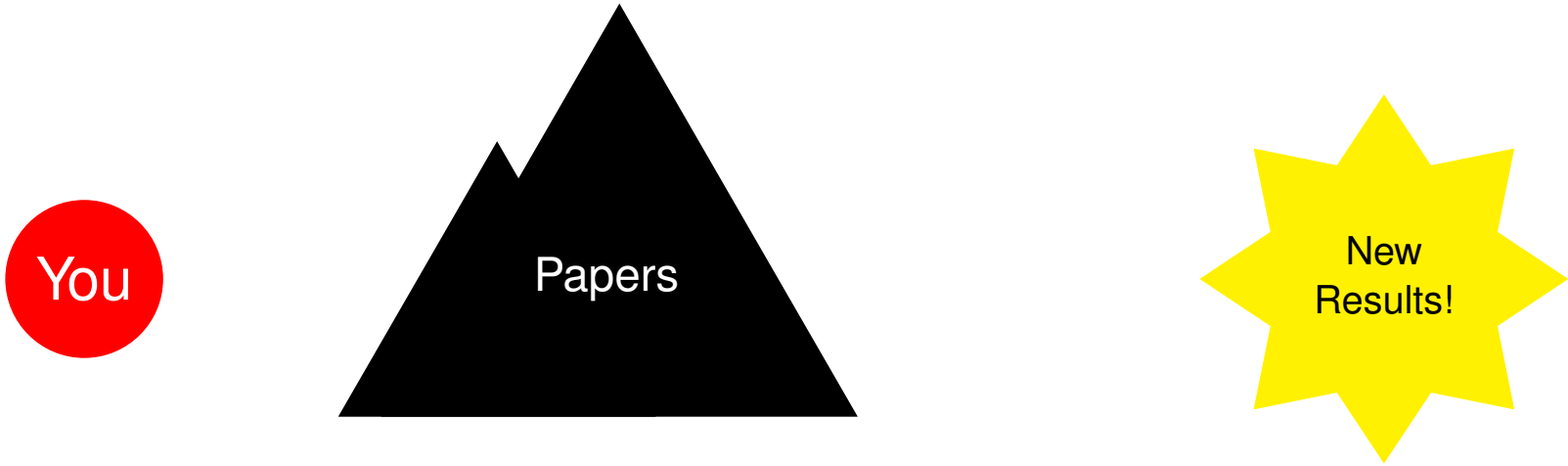

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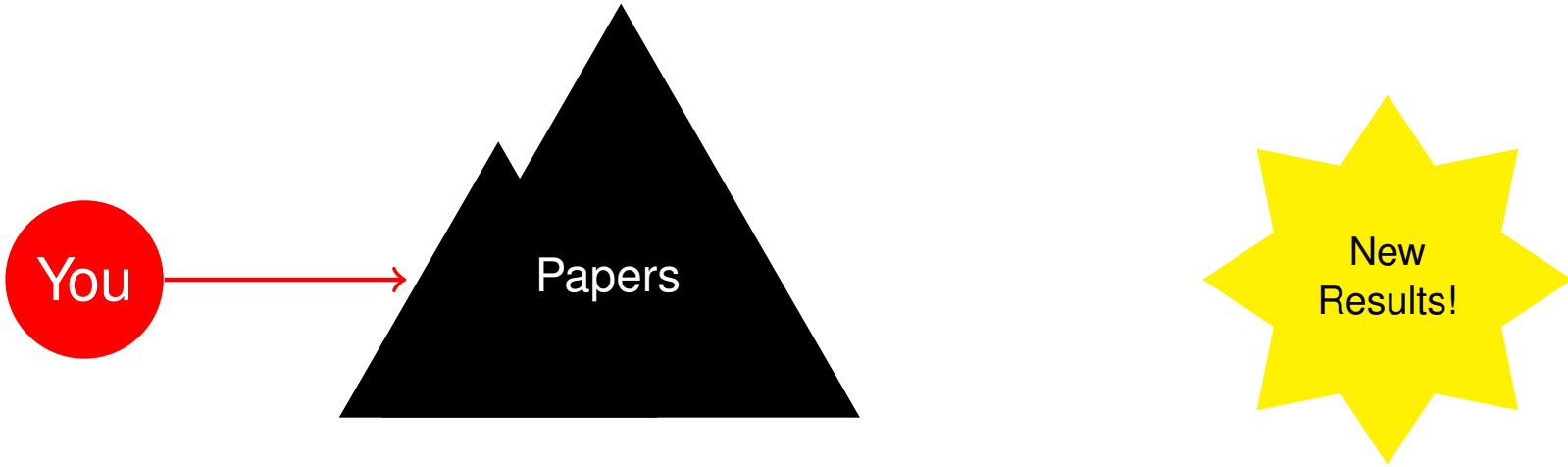

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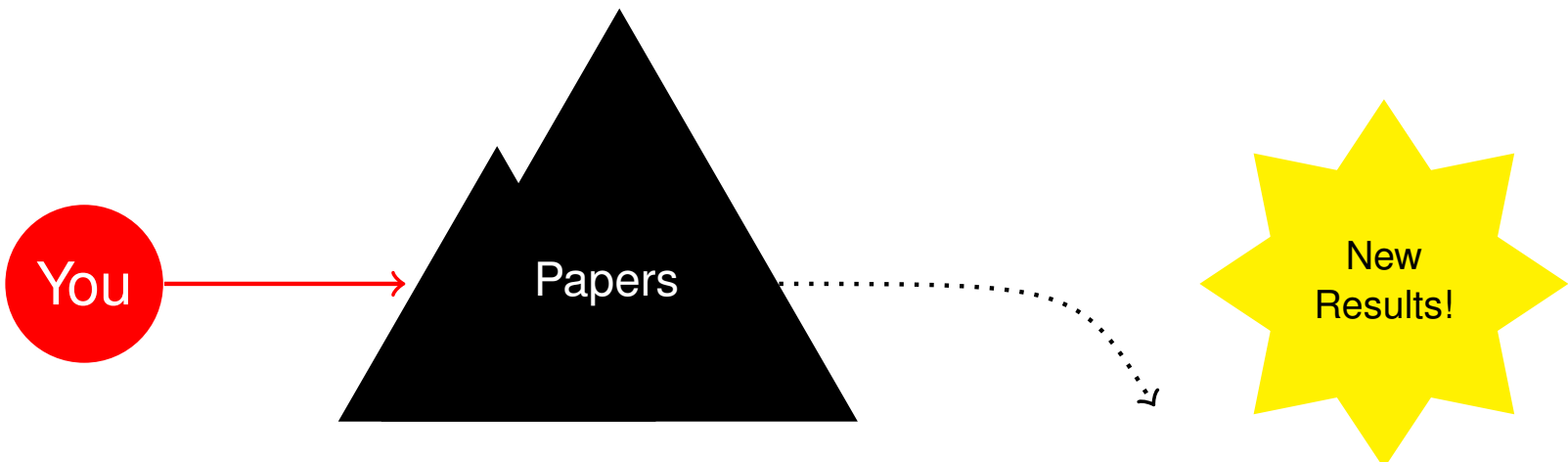

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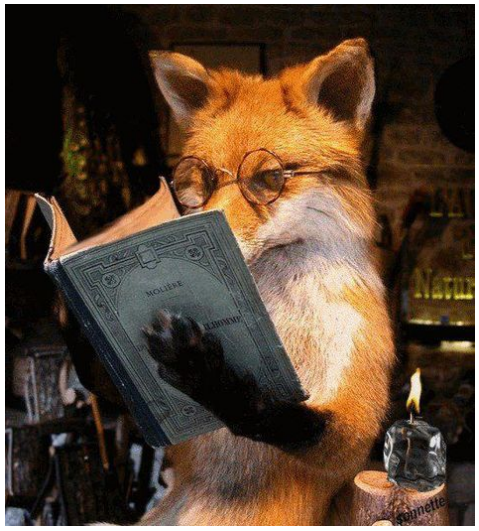

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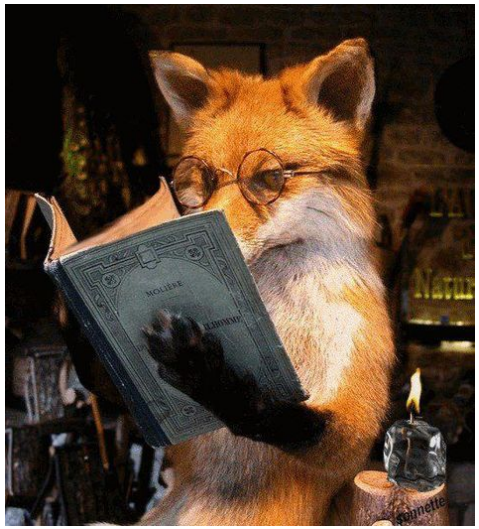

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- Assess the contribution?
- Relate to your own work?

Kinds of reading

- Reading for evaluation/assessment
  - Reviewing a paper
  - Reading competing work
  - Literature review (your comps!)
- Reading for core knowledge
  - Work directly relevant for your research
  - Background material for your area (e.g., some field of math)
- Exploratory reading
  - What was that crazy paper at Top Conference about?
  - Is there anything to this cryptocurrency stuff?
  - Subfield X seems to use related techniques to mine.

More?

Three Reading Adventures

A Framework for Defining Logics

ROBERT HARPER

Carnegie-Mellon University, Pittsburgh, Pennsylvania

FURIO HONSELL

Università di Udine, Udine, Italy

AND

GORDON PLOTKIN

Edinburgh University, Edinburgh, United Kingdom

Abstract. The Edinburgh Logical Framework (LF) provides a means to define (or present) logics. It is based on a general treatment of syntax, rules, and proofs by means of a typed λ-calculus with dependent types. Syntax is treated in a style similar to, but more general than, Martin-Löf's system of arities. The treatment of rules and proofs focuses on his notion of a *judgment*. Logics are represented in LF via a new principle, the *judgments as types* principle, whereby each judgment is identified with the type of its proofs. This allows for a smooth treatment of discharge and variable occurrence conditions and leads to a uniform treatment of rules and proofs whereby rules are viewed as proofs of higher-order judgments and proof checking is reduced to type checking. The practical benefit of our treatment of formal systems is that logic-independent tools, such as proof editors and proof checkers, can be constructed.

Categories and Subject Descriptors: F.3.1 [**Logics and Meanings of Programs**]: Specifying and Verifying and Reasoning about Programs; F.4.1 [**Mathematical Logic and Formal Languages**]: Mathematical Logic

General Terms: Algorithms, Theory, Verification

Additional Key Words and Phrases: Formal systems, interactive theorem proving, proof checking, typed lambda calculus

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- JACM 1993 paper, 1700 citations
- 42 pages long
- Suffered through for about 1 year as an early doctoral student
  - Lacked knowledge of conventions
  - Paper also tough reading

Infinitary Logics

- I got curious about “logics” with infinite formulas
  - Infinite branching reasonably well understood
  - Infinitely deep much less studied

- Deep dive in the library, including Finnish dissertations

- Wrote this up on my blog after the dust settled:

  `https://queuea9.wordpress.com/2012/07/12/infinitary-logics/`

Writing a summary of what you read!

Treasured friends

However obscure the venue
However ignored or neglected
Some works seem to befriend you
Now enlightened, enriched, and corrected

- Henk Barendregt, “Lambda Calculi with Types”, Handbook of Logic in CS, 1993
- Jean-Yves Girard, “Proofs and Types”, 1989

To conclude

- Reading is an art
  - What should I read?
  - How? (evaluation, core knowledge, exploratory)
- You will improve with practice
- Your research will benefit

> Take your place in the company of educated men and women throughout the ages!