#### Contributed article

## **Trends in Computer Science Research**

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#### Introduction

### 20 TECH TRENDS TRENDS FOR 2013

# GET MORE PHYSICAL

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TECHNOLOGY DIRECTOR, MILAN

arch field.

d increased over

In 2013, the combination of 20-nanometer processors (ARM, Intel, and Apple are planning launches for Q2/Q3) and 4G Networks becoming available in most countries will alter how we use our smart phones.

research in most

#### HUMAN-COMPUTER INTERACTION GETS MORE HUMANISTIC

MARK ROLSTON CHIEF CREATIVE OFFICER, AUST IN

#### WE LOSE CONTROL OF OUR CARS

KATIE DILL CREATIVE DIRECTOR, SAN FRANCISCO

Our cars are becoming ever more automated. They are parallel parking themselves, monitoring our speed while in cruise control, and now cons ourh metr of the devic Virtualization paym voice Business Intelligence grant. infon ing b Enterprise Mobility and f CRM 2.0 Social Networks authe Cloud Computing huma dose Web 2.0 to 3.0. Oregon IT on ea Collaboration Portal In fied Communications

#### **Analysis**

Datasets: Collected from 1990 - 2010

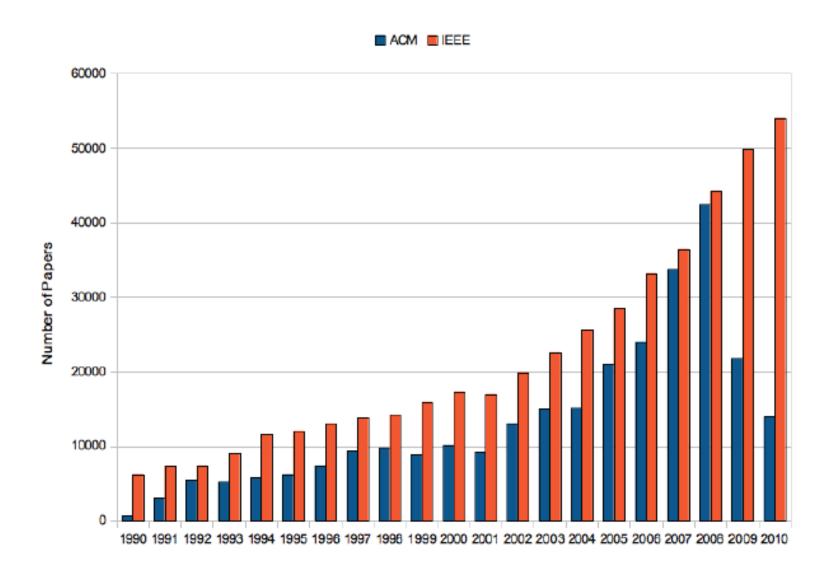
- ACM Dataset: ACM Digital Library
- IEEE Dataset: IEEE Xplore Digital Library
- NSF Dataset: Publicly available awarded grants from www.nsf.gov



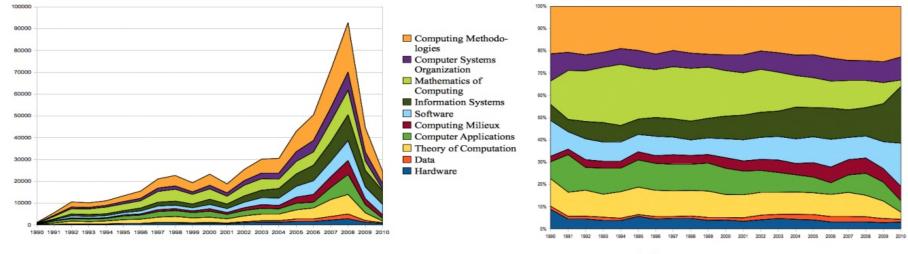


### **Analysis**

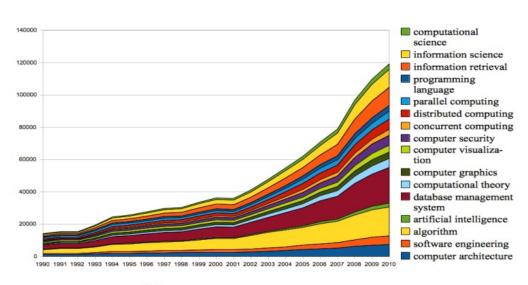
#### **Datasets Sizes**



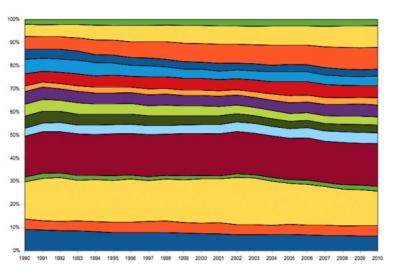
#### **Landscapes of Computer Science research**



(a) ACM: Frequency



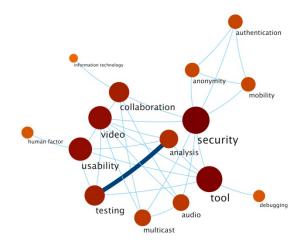
(b) ACM: Fraction



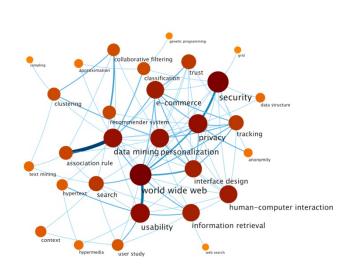
(c) IEEE: Frequency

(d) IEEE: Fraction

#### **Networks of Computer Science Research**

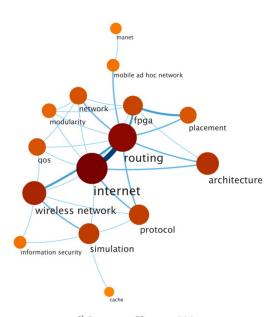


(a) Security Cluster: 1995



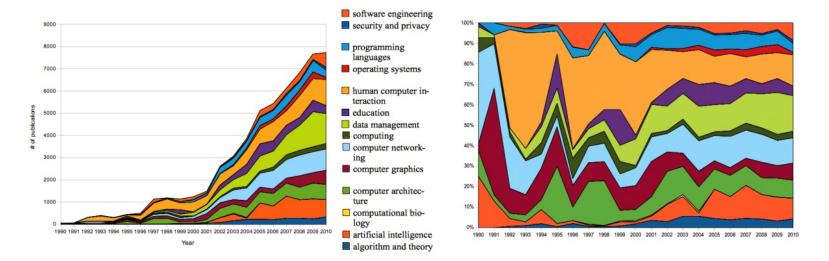
internet database information retrieval hypermedia nition www. world wide web information visualization reinforcement learning network security

(b) Multimedia Cluster: 1995



(c) World Wide Web Cluster: 2001

d) Internet Cluster: 2001



education

(a) ACM: Frequency

10000 9000

7000

6000

5000

3000

2000

₩ 4000

software engineering security and privacy programming languages operating systems human computer interacdata management computing computer networking computer graphics computer architecture computational biology artificial intelligence algorithm and theory

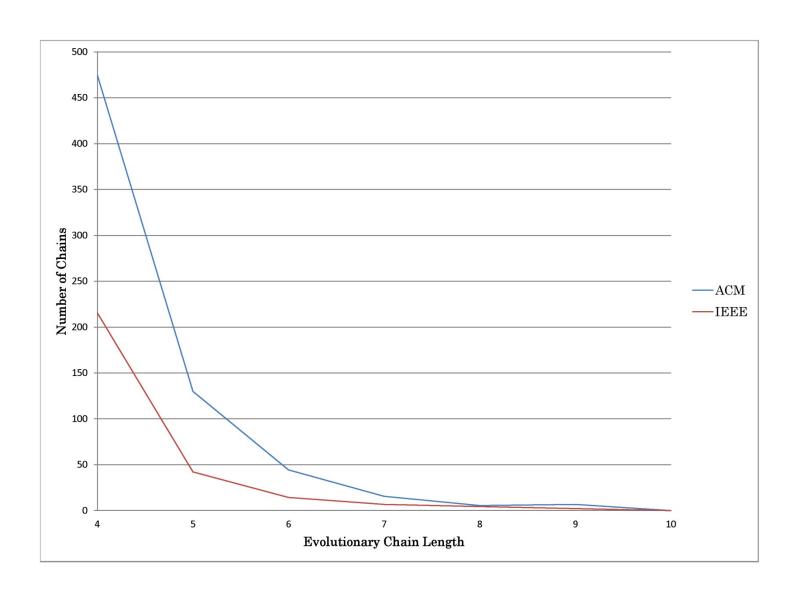
(c) IEEE: Frequency

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

(b) ACM: Fraction

(d) IEEE: Fraction

#### **Communities of CS researchers**



### **Key Findings**

- CS continues to experience continuous and fundamental transformation.
- CS research teams are short-lived and small-sized
   4-6 researchers, half of which leaves in four years.
- A typical scientist's research focus changes in a 10year cycle and often includes a once-in-a-career dramatic shift, likely in response to evolving technology creating new CS fields.
- A burst of new keywords in grants precedes their burst in publications; less than 1/3 of new keywords burst in publications first, reflecting the importance of funding for success of new CS fields.