Lecture 1:
CS 5306 / INFO 5306:
Crowdsourcing and Human Computation

Haym Hirsh

Gates 352

Annie Kai Ian Cheang View profile ★★★★★ (1 user) More options Apr 10 1995, 3:00 am

Hi you all:

I don't know if this is the proper place to post this, but I got the message below from one of the other newsgroup I'm in, and I just want to post it here to see if anyone could help.

---------- forwarded message begins----------
Date: Mon, 10 Apr 1995 04:44:56 PST
Reply-To: Medical student discussion list <MEDSTU-L%UNMVMA.BIT...@cmsa.Berkeley.EDU>
Sender: Medical student discussion list <MEDSTU-L%UNMVMA.BIT...@cmsa.Berkeley.EDU>
From: Cai Quanqing <ca...@MCCUX0.MECH.PKU.EDU.CN>
X-To: medst...@unmvma.bitnet
To: Multiple recipients of list MEDSTU-L <MEDSTU-L%UNMVMA.BIT...@cmsa.Berkeley.EDU>

Hi,

This is Peking University in China, a place those dreams of freedom and democracy. However, a young, 21-year old student has become very sick and is dying. The illness is very rare. Though they have tried, doctors at the best hospitals in Beijing cannot cure her; may do not even know what illness it is. So now we are asking the world -- can somebody help us?

Here is a description of the illness:

The young woman -- her name is Zhu Ling -- is a student in the chemistry department. On DEC. 5, 1994, Zhu Ling felt sick to her stomach. Three days later, her hair began to fall out and within two days she was completely bald. She entered the hospital, but doctors could not discover the season for her illness. However, after she was in the hospital for a month, she began to fell better and her hair grew back. Zhu Ling went back to school in February, but in March her legs began to ache severely, and she felt dizzy. She entered XieHe Hospital - Chinese most famous hospital. In early March and on March 15, her symptoms worsened. She Began to facial paralysis, central muscle of eye's paralysis, self-controlled respiration disappeared. So she was put on a respirator.

The doctors did many tests for many diseases(include anti-H2V, spinal cord puncture, NMR, immune system, chemical drug intoxication ANA,ENA,DSONA,ZG and Lyme), but all were negative, except for Lyme disease(ZGM(+)).

The doctors now think that it might be acute disseminated encephalomyelitis(ADEM) or lupus erythematosus(LE), but the data from the tests do not support this conclusion.

The doctors are now treating Zhu Ling with broad-spectrum antibiotic of cephalosporin, anti-virus drug, hormone, immun-oadjuvent, gamma globulin intravenous injection and have given her plasma exchange(PE) of 10,000 CCs. But Zhu Ling has not responded -- she reamers in a vegetative state, sustained by life support.

If anyone has heard of patients with similar symptoms -- or have any ideas as to what this illness could be, please contact us. We are Zhu Ling's friends and we are disparate to help her.

This is the first time that Chinese try to find help from Internet, please send back E-mail to us. We will send more crystal description of her illness to you.

Thank you very much
Peking University
April 10th, 1995

==========

Please foreword this message to your freinds if you think they can help us ,Thanks advanced!

email:ca...@mccux0.mech.pku.edu.cn

End of messages

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Ron Holt, M.D. Univ. of Wisconsin - Medical school via Bennett Vogelman, M.D., U.W. Hospital, Madison, WI
Cornelius Poppe, DVM PhD via Jack Woodall

4/25
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Steve Rothman
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James T. Byrd, Ph.D. Kirk Jones, M.D., Resident in Pathology, Univ. of California, San Francisco.
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Dr. Helmut Sell, Regional Adviser on Health & Behaviour, WHO/SEARO, New Delhi. **India**
Mikael Gennser, MD, PhD, Senior researcher, Division of Naval Medicine, National Defence Research Establishment, Sweden

International Electronic Link Solves Medical Puzzle

DIPLOMATS FOSTERING the slow thaw in US-China relations might look to the medical community for inspiration.

Via the worldwide computer Internet and other means of communication, physicians and other medical scientists from coast to coast in the United States and at least 17 other countries have helped their mainland China colleagues treat a university student with a challenging array of signs and symptoms.

The patient, Zhu Lingling, 21, a junior studying physical chemistry in Beijing, reportedly experienced abdominal pain and alopecia in December 1994 but returned to college in February after she responded to Chinese traditional therapy and nutritional support.

A month later, she was hospitalized again with a variety of central nervous system complaints and became comatose within 5 days.

After tests ruled out a number of tentative diagnoses and she did not respond significantly to treatment, students at Beijing University who had learned of the complicated case sent an electronic mail request for diagnostic and therapeutic assistance. This was relayed by several groups on the Internet.

Apparently the first to respond from the United States with the correct diagnosis was Stephen O. Cunnion, MD, PhD, MPH.

A US Navy captain who is an infectious disease epidemiologist in the Department of Preventive Medicine and Biostatistics, Uniformed Services University, Bethesda, Md, Cunnion diagnosed the problem as thallium poisoning.

In the next 4 weeks more than 80 other individuals and groups in medicine—out of some 2000 that eventually responded—supported Cunnion's diagnosis. At least one physician in Beijing had suggested the thallium poisoning diagnosis, but it had not been put to the test there.

However, following the Internet response, the Chinese conducted tests that confirmed the thallium poisoning diagnosis. Physicians and other medical scientists in California, particularly the University of California, Los Angeles (UCLA), coordinated much of the succeeding effort with colleagues elsewhere.

Cunnion says that Chinese physicians now report the young woman has regained consciousness. The prognosis is encouraging, say many of the experts involved, but recovery—perhaps with only limited neurological sequelae—may be a long process.

The source of the poisoning has not been determined. One report indicates that Chinese authorities are looking into the possibility of criminal intent.

In the meantime, physicians and others involved in the evolving field of telemedicine suggest that this experience offers some insight into its future potential.—by Phil Gunby

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nature Vol 438 15 December 2005

SPECIAL REPORT

Internet encyclopaedias go head to head

Jimmy Wales' Wikipedia comes close to Britannica in terms of the accuracy of its science entries, a *Nature* investigation finds.

One of the extraordinary stories of the Internet age is that of Wikipedia, a free online encyclopaedia that anyone can edit. This radical and rapidly growing publication, which includes close to 4 million entries, particularly great: the average science entry in Wikipedia contained around four inaccuracies; Britannica, about three. site's increasing influence, questioning whether multiple, unpaid editors can match paid professionals for

A NEW PROOF OF THE DENSITY HALES-JEWETT THEOREM

D. H. J. POLYMATH

ABSTRACT. The Hales–Jewett theorem asserts that for every r and every k there exists n such that every r-colouring of the n-dimensional grid $\{1,\dots,k\}^n$ contains a combinatorial line. This result is a generalization of van der Waerden's theorem, and it is one of the fundamental results of Ramsey theory. The theorem of van der Waerden has a famous density version, conjectured by Erdős and Turán in 1936, proved by Szemerédi in 1975, and given a different proof by Furstenberg in 1977. The Hales–Jewett theorem has a density version as well, proved by Furstenberg and Katznelson in 1991 by means of a significant extension of the ergodic techniques that had been pioneered by Furstenberg in his proof of Szemerédi's theorem. In this paper, we give the first elementary proof of the theorem of Furstenberg and Katznelson, and the first to provide a quantitative bound on how large n needs to be. In particular, we show that a subset of $\{1,2,3\}^n$ of density δ contains a combinatorial line if n is at least as big as a tower of 2s of height $O(1/\delta^2)$. Our proof is surprisingly simple: indeed, it gives arguably the simplest known proof of Szemerédi's theorem.

1. INTRODUCTION

1.1. **Statement of our main result.** The purpose of this paper is to give the first elementary proof of the density Hales–Jewett theorem. This theorem, first proved by Furstenberg and Katznelson [FK89, FK91], has the same relation to the Hales–Jewett theorem [H163] as Szemerédi's theorem [Sze75] has to van der Waerden's theorem [vdW27]. Before we go any further, let us state all four theorems. We shall use the notation $[k]$ to stand for the


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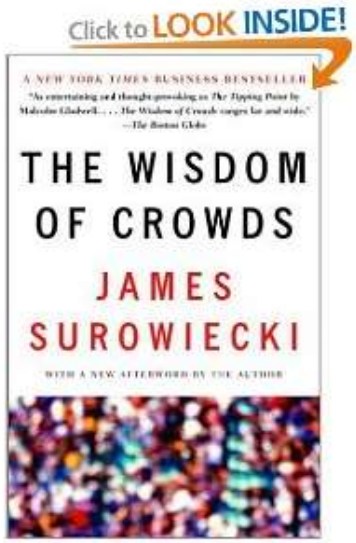

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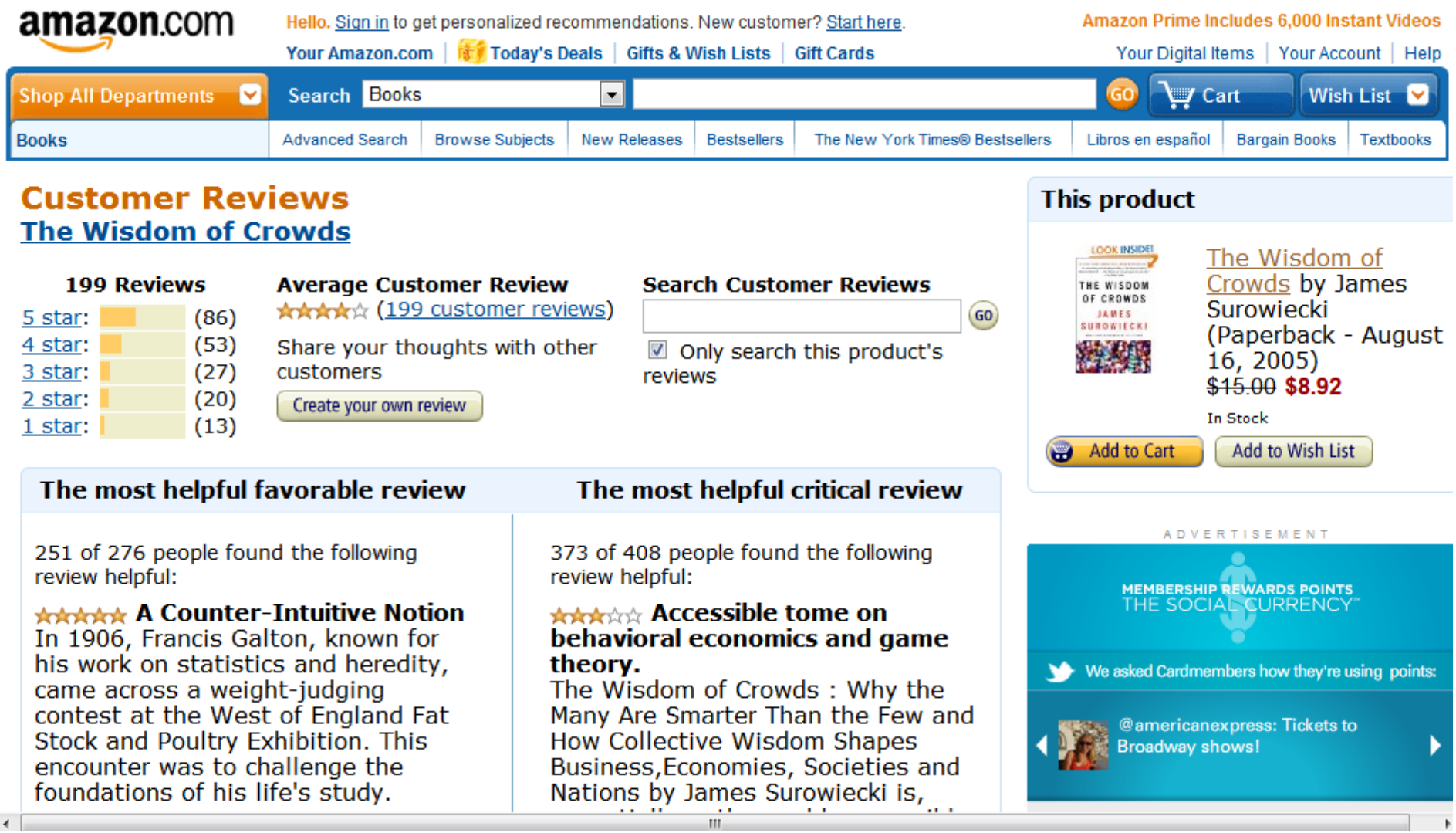
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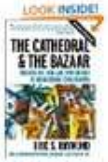

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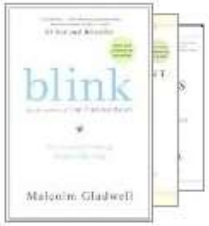

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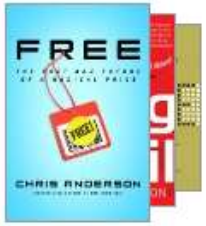

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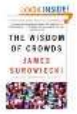

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Announcement

Congratulations to team "BellKor's Pragmatic Chaos" for being awarded the $1M Grand Prize on September 21, 2009. This Forum is now read-only.

Pages: **1**

Index » Grand Prize » **Grand Prize awarded to team BellKor's Pragmatic Chaos**

2009-09-18 09:58:04 #1

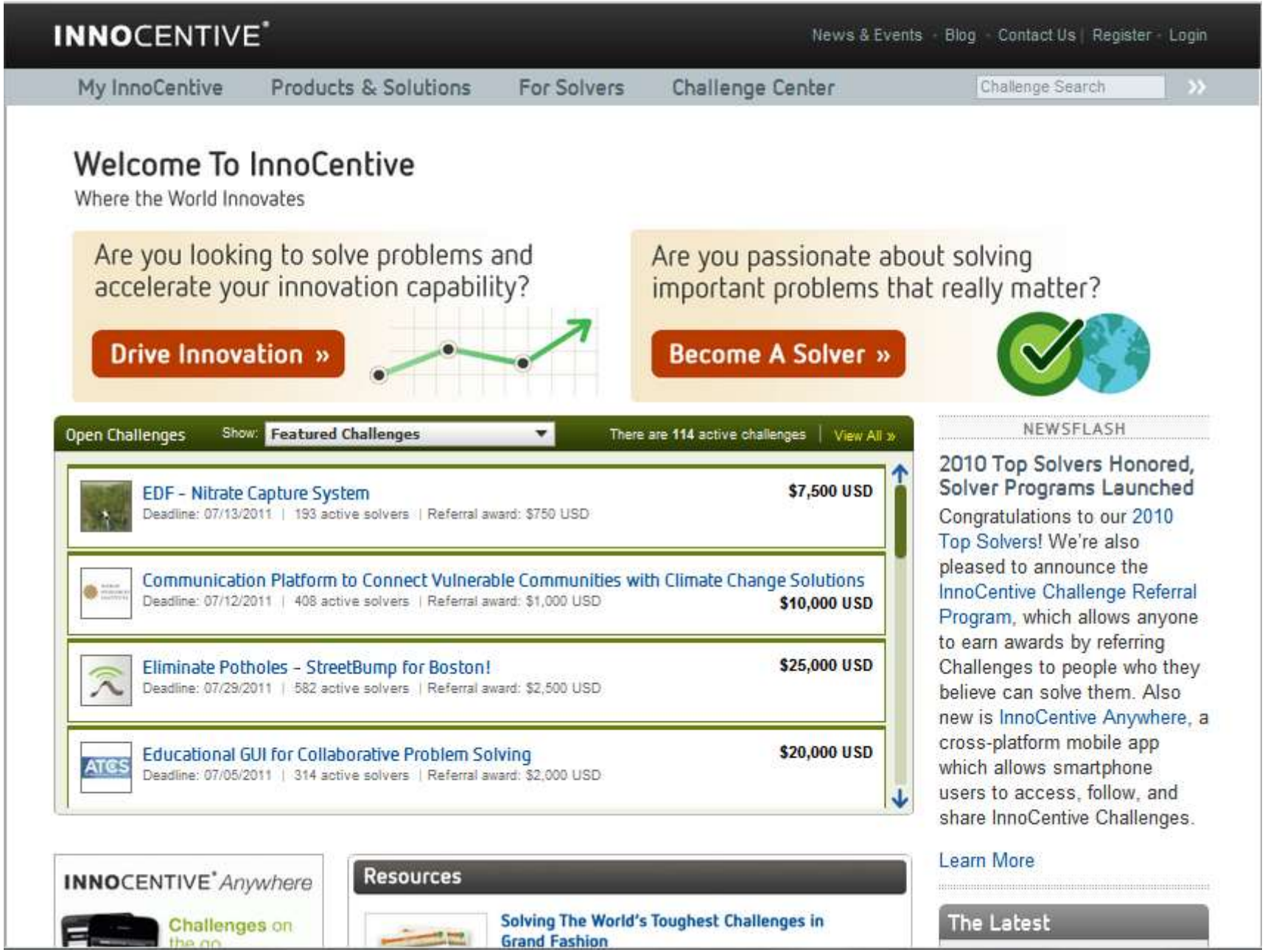
prizemaster
Administrator

From: Netflix HQ
Registered: 2006-08-29
Posts: 181

Website

It is our great honor to announce the $1M Grand Prize winner of the Netflix Prize contest as team BellKor's Pragmatic Chaos for their verified submission on July 26, 2009 at 18:18:28 UTC, achieving the winning RMSE of 0.8567 on the test subset. This represents a 10.06% improvement over Cinematch's score on the test subset at the start of the contest. We congratulate the team of Bob Bell, Martin Chabbert, Michael Jahrer, Yehuda Koren, Martin Piotte, Andreas Töscher and Chris Volinsky for their superb work advancing and integrating many significant techniques to achieve this result.

The Prize was awarded in a ceremony in New York City on September 21st, 2009. We will post a video on this forum of the presentation the team delivered about their Prize algorithm. In accord with the Rules the winning team has prepared a system description consisting of three papers, which we both make public below.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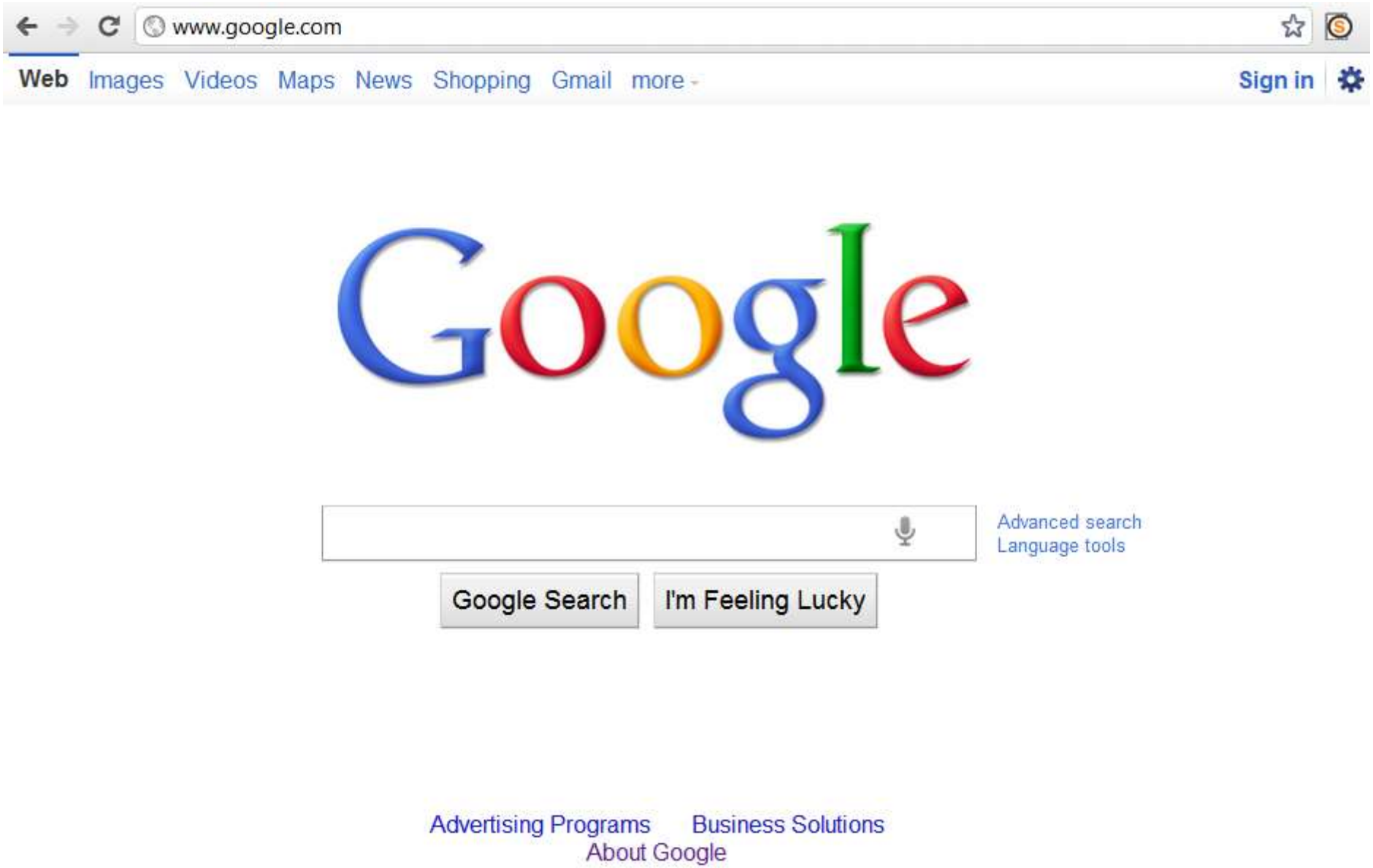
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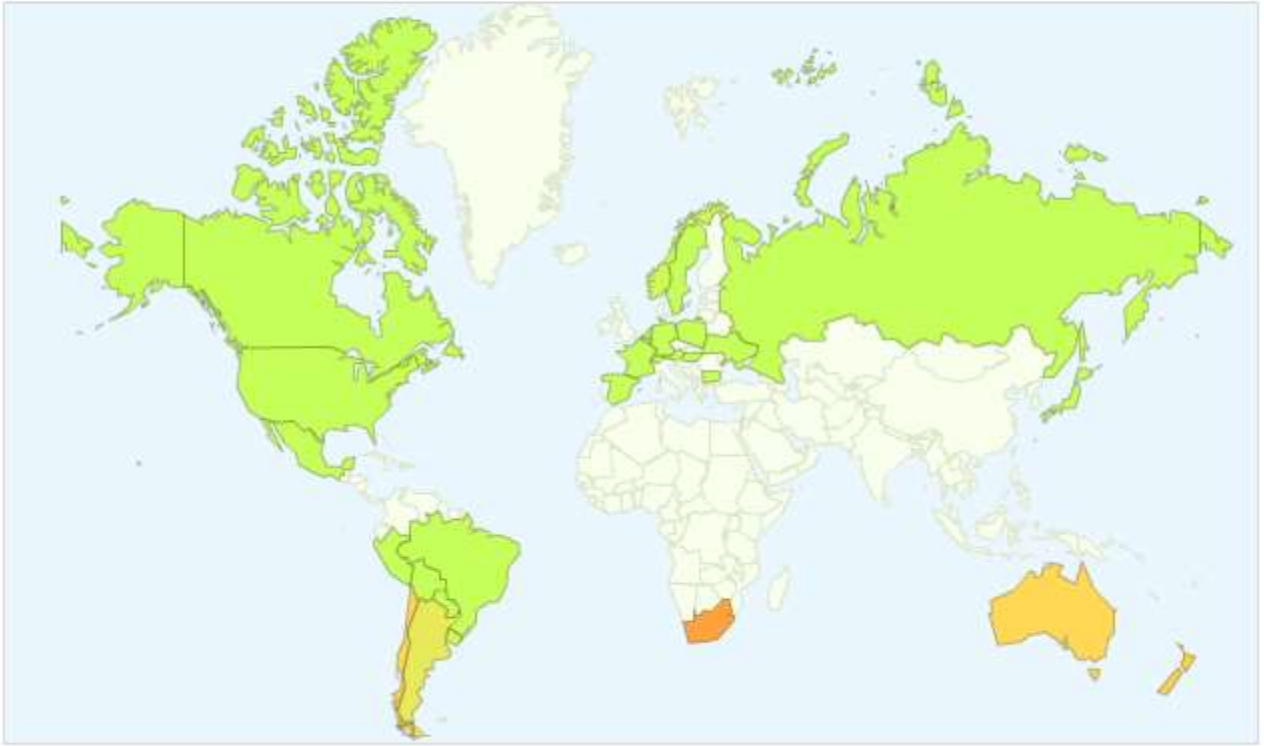

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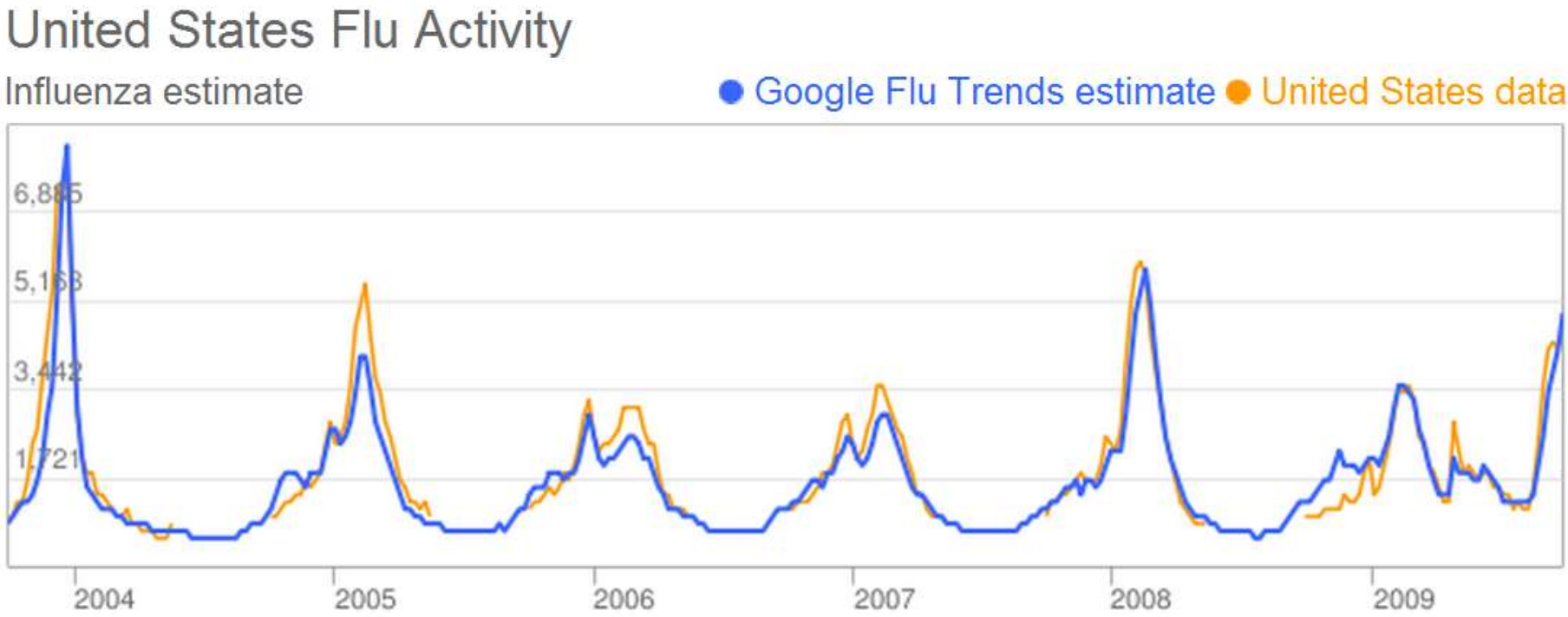

United States: Influenza-like illness (ILI) data provided publicly by the U.S. Centers for Disease Control.

By MICHAEL ETTREDGE, JOHN GERDES, *and* GILBERT KARUGA

Using Web-based Search Data to Predict MACROECONOMIC STATISTICS

Tracking common search terms used on the Web can produce accurate, useful statistics about the unemployment rate. We hope to extend this approach to other economic statistics.

This study investigates the potential of using data about Web searches to predict an important macroeconomic statistic, specif-

The Internet is credited with overcoming information bottlenecks in key areas of the labor market, affecting how worker-firm matches are made, how labor services are delivered, and how local markets

Predicting consumer behavior with Web search

Sharad Goel[1], Jake M. Hofman[1], Sébastien Lahaie[1], David M. Pennock[1], and Duncan J. Watts[1]

Microeconomics and Social Systems, Yahoo! Research, 111 West 40th Street, New York, NY 10018

Edited* by Simon A. Levin, Princeton University, Princeton, NJ, and approved August 10, 2010 (received for review April 29, 2010)

Recent work has demonstrated that Web search volume can "predict the present," meaning that it can be used to accurately track outcomes such as unemployment levels, auto and home sales, and disease prevalence in near real time. Here we show that what consumers are searching for online can also predict their collective future behavior days or even weeks in advance. Specifically we use search query volume to forecast the opening weekend box-office revenue for feature films, first-month sales of video games, and the rank of songs on the Billboard Hot 100 chart, finding in all cases that search counts are highly predictive of future outcomes. We also find that search counts generally boost the performance of baseline models fit on other publicly available data, where the boost varies from modest to dramatic, depending on the application in question. Finally, we reexamine previous work on tracking flu trends and show that, perhaps surprisingly, the utility of search data relative to a simple autoregressive model is modest. We conclude that in the absence of other data sources, or where small improvements in predictive performance are material, search

ogy, Google Flu Trends (http://www.google.org/flutrends) provides real-time estimates of flu incidence in several countries. Finally, Choi and Varian (3, 4) have compared search volume to economic activity, including auto and home sales, international visitor statistics, and US unemployment claims; and similar work has been reported for German unemployment claims (11). In this paper, we further this work by considering the ability of search to predict events days or weeks in advance of their actual occurrence.

In so doing we also emphasize an often overlooked aspect of prediction—namely, that performance is relative. To illustrate, consider predicting the weather in Santa Fe, New Mexico, where it is sunny 300 days a year. A prediction of sunshine every day would be correct 82% of the time, yet hardly impressive; nor could a model that fails to outperform the simple, autoregressive rule that tomorrow's outcome will be like today's be said to be predictive in any interesting way. Correspondingly, the predictive

The Predictive Power of Online Chatter

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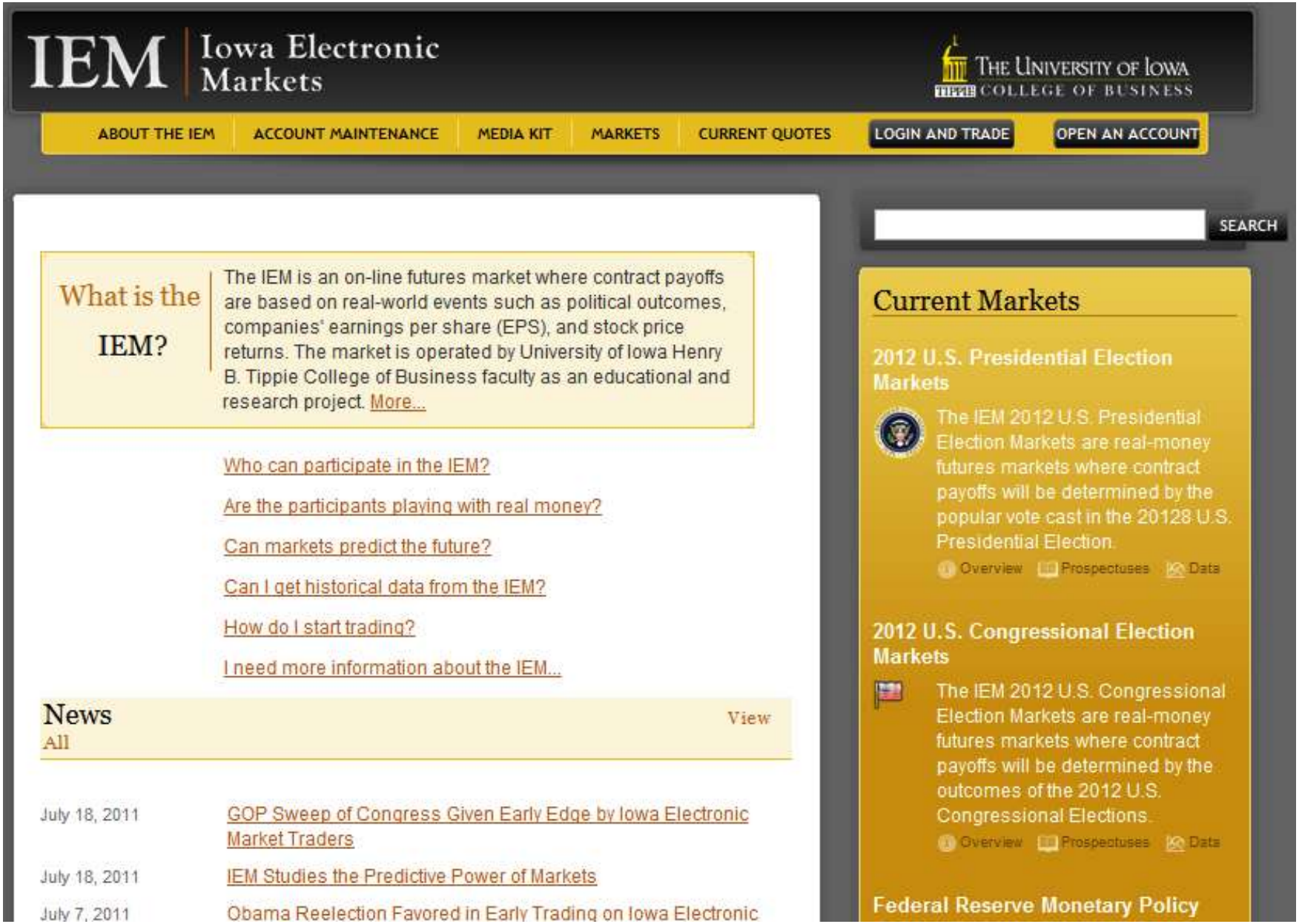
ABSTRACT

An increasing fraction of the global discourse is migrating online in the form of blogs, bulletin boards, web pages, wikis, editorials, and a dizzying array of new collaborative technologies. The migration has now proceeded to the point that topics reflecting certain individual products are sufficiently popular to allow targeted online tracking of the ebb and flow of chatter around these topics. Based on an analysis of around half a million sales rank values for 2,340 books over a period of four months, and correlating postings in

1. INTRODUCTION

The World Wide Web represents a global, timely, and largely unregulated touchstone of popular opinion, which many believe may be exploited for early insights into new trends and opinions. Areas proposed for such analysis include the outcome of political elections, the emergence of the next big musical group/toy/consumer electronic device, and the pulse of the global economy. Yet, despite widely touted opinions that marketing will soon be a small branch of machine learning, there has been little work formally demonstrating connections between online content and customer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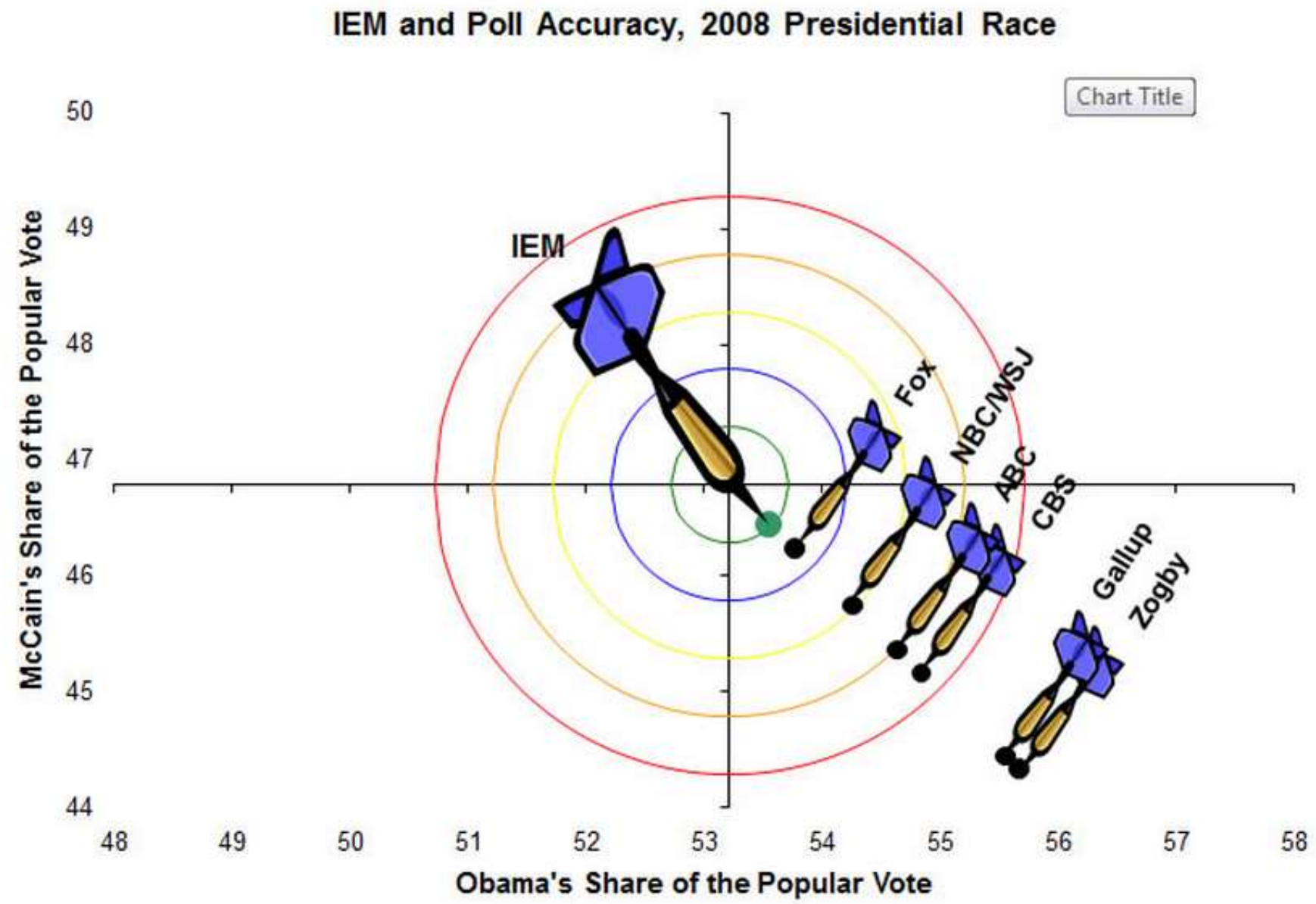
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Pothole Patrol (P2)

The Pothole Patrol (P^2) uses the opportunistic mobility of sensor-equipped vehicles to detect and report the surface conditions of roads. Each car in the system carries a CarTel node with 3-axis acceleration and GPS sensors, gathering location-tagged vibration data at a frequency of 400 Hz (we would've liked to use a higher sample rate, but the sensors we use max out at 400 samples per second).

P^2 uses CarTel's opportunistic wireless protocols to deliver the data over whatever wireless network is available to a back-end server. The server processes this vibration data using signal processing and data correlation techniques to assess surface conditions.

We have deployed P^2 on 10 taxis (out of the 27 in our fleet testbed) running in the Boston area. Our analysis algorithms, which we calibrated against a human's perception of how bad a given pothole or surface is, are able to detect 75% of surface conditions reported as bad by a human observer, with a false positive rate of less than 5%. Overall, in a week's worth of driving, our system found about 4,800 bad surface locations.

We went out and took pictures of some of the highest scoring detected problems. You can see why these things make you grimace when you drive over them. A schematic of the P^2 data processing pipeline is shown in the picture on the right, below.


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The logo of Wikipedia, a globe featuring glyphs from many different writing systems

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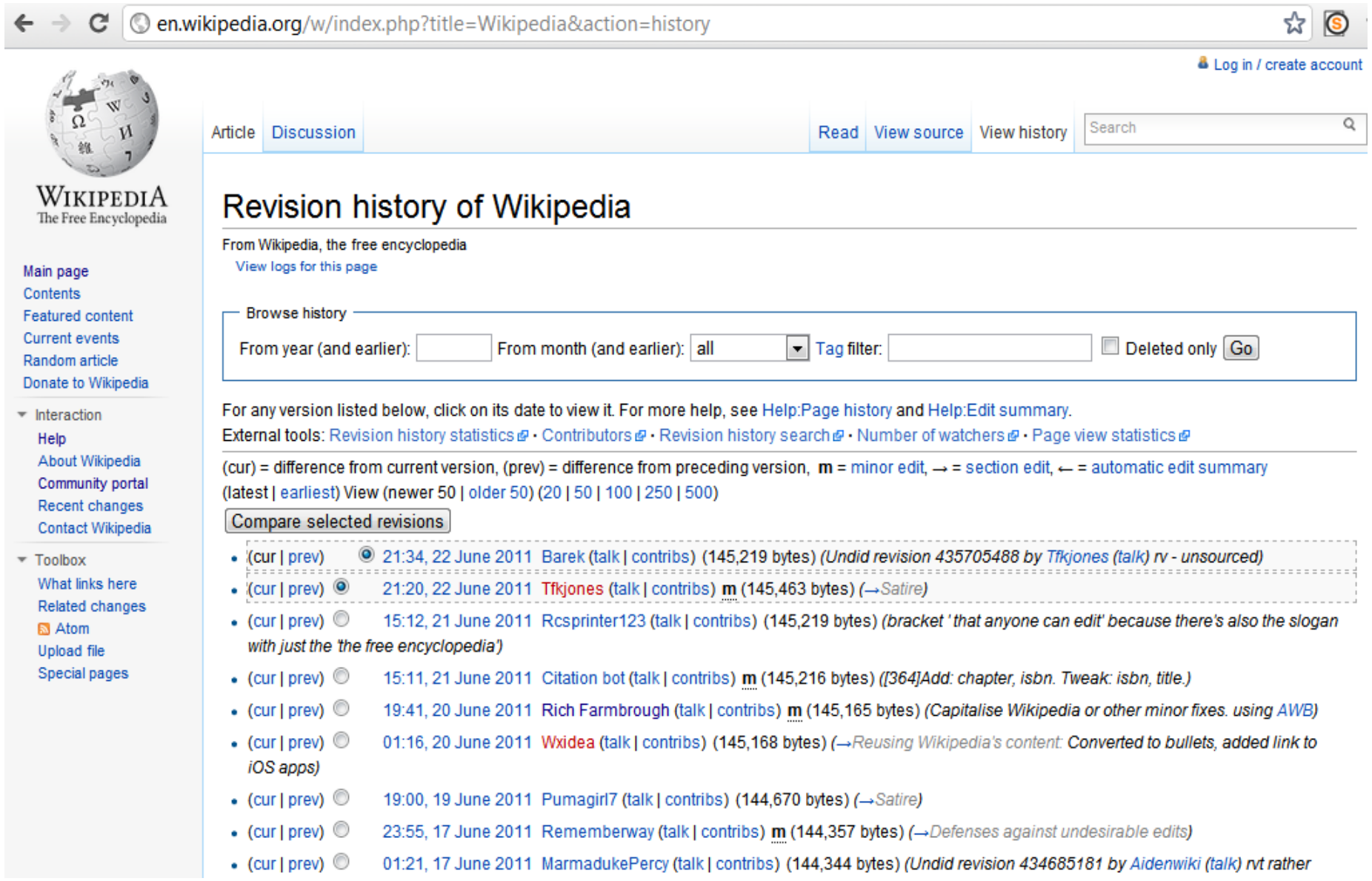
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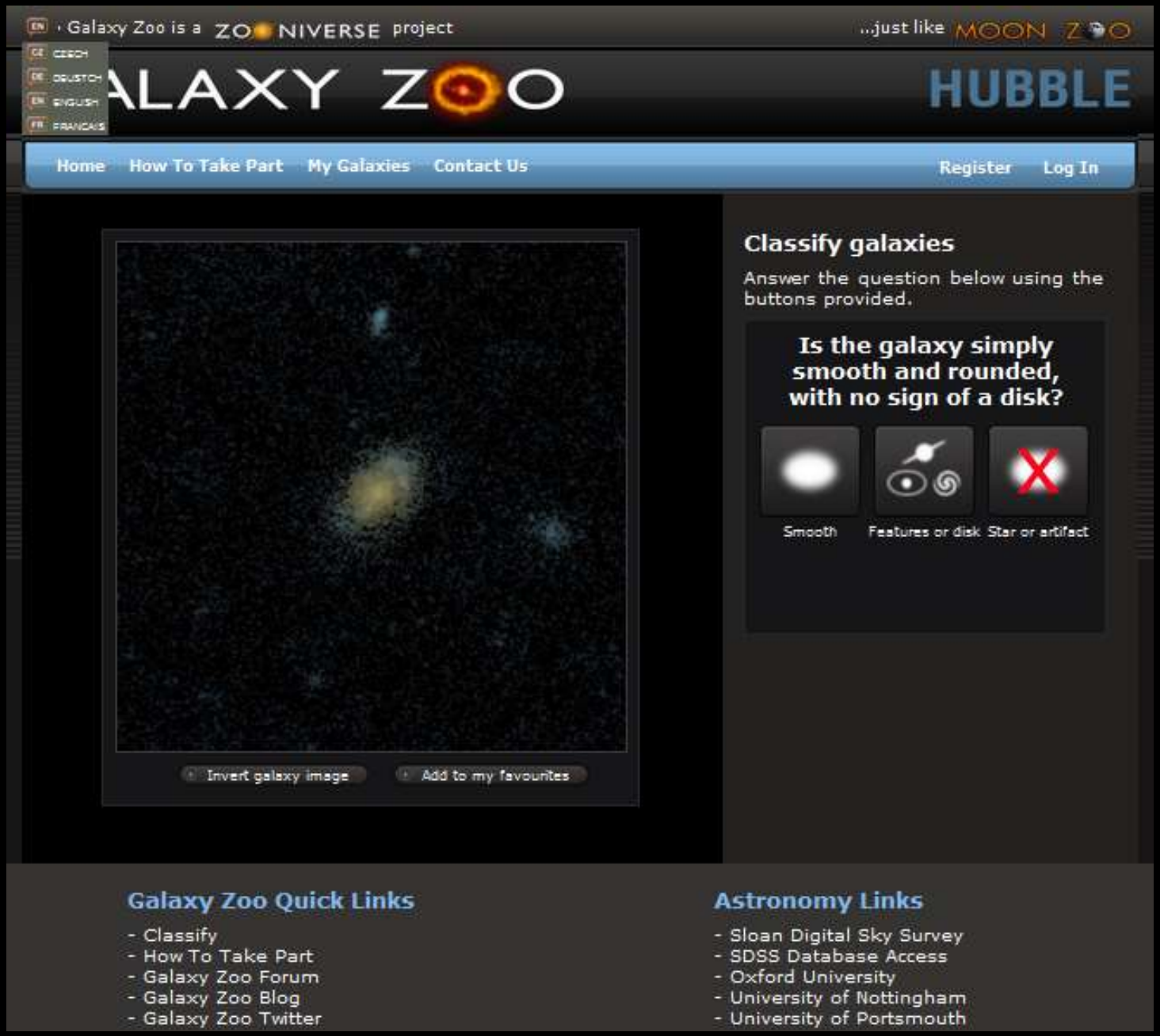
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Predicting protein structures with a multiplayer online game

Seth Cooper, Firas Khatib, Adrien Treuille, Janos Barbero, Jeehyung Lee, Michael Beenen, Andrew Leaver-Fay, David Baker, Zoran Popović & Foldit players

Affiliations | Contributions | Corresponding authors

Nature **466**, 756–760 (05 August 2010) | doi:10.1038/nature09304
Received 22 January 2010 | Accepted 30 June 2010

People exert large amounts of problem-solving effort playing computer games. Simple image- and text-recognition tasks have been successfully 'crowd-sourced' through games[1, 2, 3], but it is not clear if more complex scientific problems can be solved with human-directed computing. Protein structure prediction is one such problem: locating the biologically relevant native conformation of a protein is a formidable computational challenge given

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Many hands make light work

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A natural polypeptide chain can fold into a native protein in microseconds, but predicting such stable three-dimensional structure from any given amino-acid sequence and first physical principles

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Cheap and Fast — But is it Good?
Evaluating Non-Expert Annotations for Natural Language Tasks

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Abstract

Human linguistic annotation is crucial for many natural language processing tasks but can be expensive and time-consuming. We explore the use of Amazon's Mechanical Turk system, a significantly cheaper and faster method for collecting annotations from a broad base of paid non-expert contributors over the Web. We investigate five tasks: affect recognition, word similarity, recognizing textual entailment, event temporal ordering, and word sense disambiguation. For all five, we show high agreement between Mechanical Turk non-expert annotations and existing gold standard labels provided by expert labelers. For the task of affect recognition, we also

and financial cost. Since the performance of many natural language processing tasks is limited by the amount and quality of data available to them (Banko and Brill, 2001), one promising alternative for some tasks is the collection of non-expert annotations.

In this work we explore the use of Amazon Mechanical Turk[1] (AMT) to determine whether non-expert labelers can provide reliable natural language annotations. We chose five natural language understanding tasks that we felt would be sufficiently natural and learnable for non-experts, and for which we had gold standard labels from expert labelers, as well as (in some cases) expert labeler agree-

Utility data annotation with Amazon Mechanical Turk

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Abstract

We show how to outsource data annotation to Amazon Mechanical Turk. Doing so has produced annotations in quite large numbers relatively cheaply. The quality is good, and can be checked and controlled. Annotations are produced quickly. We describe results for several different annotation problems. We describe some strategies for determining when the task is well specified and properly priced.

1. Introduction

Big annotated image datasets now play an important role in Computer Vision research. Many of them were built **in-house** ([18, 11, 12, 3, 13, 5] and many others). This consumes significant amounts of highly skilled labor, requires much management work, is expensive and creates a perception that annotation is difficult. Another successful strategy is to make the annotation process **completely public**

Exp	Task	img	labels	cost USD	time	effective pay/hr
1	1	170	510	$8	750m	$0.76
2	2	170	510	$8	380m	$0.77
3	3	305	915	$14	950m	$0.41[1]
4	4	305	915	$14	150m	$1.07
5	4	337	1011	$15	170m	$0.9
Total:		982	3861	$59		

Table 1. **Collected data.** In our five experiments we have collected **3861** labels for 982 distinct images for only **US $59**. In experiments 4 and 5 the throughput exceeds 300 annotations per hour even at low ($1/hour) hourly rate. We expect further increase in throughput as we increase the pay to effective market rate.

a researcher are: (1) define an annotation protocol and (2) determine what data needs to be annotated.

The annotation protocol should be implemented within an IFRAME of a web browser. We call the implementation

Crowdsourcing User Studies With Mechanical Turk

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ABSTRACT
User studies are important for many aspects of the design process and involve techniques ranging from informal surveys to rigorous laboratory studies. However, the costs involved in engaging users often requires practitioners to trade off between sample size, time requirements, and monetary costs. Micro-task markets, such as Amazon's Mechanical Turk, offer a potential paradigm for engaging a large number of users for low time and monetary costs. Here we investigate the utility of a micro-task market for collecting user measurements, and discuss design considerations for developing remote micro user evaluation tasks. Although micro-task markets have great potential for rapidly collecting user measurements at low costs, we found that special care is needed in formulating tasks in order to harness the capabilities of the approach.

Author Keywords
Remote user study, Mechanical Turk, micro task, Wikipedia.

ACM Classification Keywords

others. Thus it is often not possible to acquire user input that is both low-cost and timely enough to impact development. The high costs of sampling additional users lead practitioners to trade off the number of participants with monetary and time costs [5].

Collecting input from only a small set of participants is problematic in many design situations. In usability testing, many issues and errors (even large ones) are not easily caught with a small number of participants [5]. In both prototyping and system validation, small samples often lead to a lack of statistical reliability, making it difficult to determine whether one approach is more effective than another. The lack of statistical rigor associated with small sample sizes is also problematic for both experimental and observational research.

These factors have led to new ways for practitioners to collect input from users on the Web, including tools for user surveys (e.g., surveymonkey.com, vividence.com), online experiments [3], and remote usability testing [2]. Such tools expand the potential user pool to anyone connected to the

Crowdsourcing Graphical Perception: Using Mechanical Turk to Assess Visualization Design

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ABSTRACT
Understanding perception is critical to effective visualization design. With its low cost and scalability, crowdsourcing presents an attractive option for evaluating the large design space of visualizations; however, it first requires validation. In this paper, we assess the viability of Amazon's Mechanical Turk as a platform for graphical perception experiments. We replicate previous studies of spatial encoding and luminance contrast and compare our results. We also conduct new experiments on rectangular area perception (as in treemaps or cartograms) and on chart size and gridline spacing. Our results demonstrate that crowdsourced perception experiments are viable and contribute new insights for visualization design. Lastly, we report cost and performance data from our experiments and distill recommendations for the design of crowdsourced studies.

ACM Classification: H5.2 [Information interfaces and presentation]: User Interfaces—Evaluation/Methodology

General Terms: Experimentation, Human Factors.

Keywords: Information visualization, graphical perception,

for ecological validity. Crowdsourced experiments may also substantially reduce both the cost and time to result.

Unfortunately, crowdsourcing introduces new concerns to be addressed before it is credible. Some concerns, such as ecological validity, subject motivation and expertise, apply to any study and have been previously investigated [13, 14, 23]; others, such as display configuration and viewing environment, are specific to visual perception. Crowdsourced perception experiments lack control over many experimental conditions, including display type and size, lighting, and subjects' viewing distance and angle. This loss of control inevitably limits the scope of experiments that reliably can be run. However, there likely remains a substantial subclass of perception experiments for which crowdsourcing can provide reliable empirical data to inform visualization design.

In this work, we investigate if crowdsourced experiments insensitive to environmental context are an adequate tool for graphical perception research. We assess the feasibility of using Amazon's Mechanical Turk to evaluate visualizations and then use these methods to gain new insights into visual-

The Online Laboratory: Conducting Experiments in a Real Labor Market*

John J. Horton† David G. Rand‡ Richard J. Zeckhauser§

Abstract

Online labor markets have great potential as platforms for conducting experiments, as they provide immediate access to a large and diverse subject pool and allow researchers to conduct randomized controlled trials. We argue that online experiments can be just as valid—both internally and externally—as laboratory and field experiments, while requiring far less money and time to design and to conduct. In this paper, we first describe the benefits of conducting experiments in online labor markets; we then use one such market to replicate three classic experiments and confirm their results. We confirm that subjects (1) reverse decisions in response to how a decision-problem is framed, (2) have pro-social preferences (value payoffs to others positively), and (3) respond to priming by altering their choices. We also conduct a labor supply field experiment in which we confirm that workers have upward sloping labor supply curves. In addition to reporting these results, we discuss the unique threats to validity

Killer	whales	are	beautiful	animals	.	I	remember	seeing
these	huge	,	**smooth**	,	black	and	white	creatures	jumping
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Greg Little, Lydia B. Chilton, Max Goldman, and Robert C. Miller. "Exploring iterative and parallel human computation processes." In *Proceedings of the ACM SIGKDD workshop on human computation*, pp. 68-76. ACM, 2010.