Information and Communications Technology Committee Annual Report

September 2012
Issues in 2011-12

• Current and Future CUIT Initiatives
  – Moving to the New Courseworks
  – Moving to New Email Provider
• Cloud Computing
• Data Reproducibility Issues
• Distance Learning Initiatives (with Education and Library Committees)
• Digital Humanities and Social Sciences Initiative
• Data Governance Update
  – New ARC Reporting System
• Columbia Student IT Initiatives
  – Open Evaluations
  – Columbia App
  – Research Match Website
Move to New Courseworks (CUIT)

• Transition: Fall ‘11 – Spring ’13
  – Past courses’ information will still be available

• New functionality, e.g.
  – Gradebook integrated with SSOL
  – Integration with library reserves
  – Better customizability
  – Better support for collaboration/communication
• Training workshops, downloadable guide, videos, FAQs
• Slides attached
New Email Provider

• Google and Microsoft considered: Google wins
  – Many Google apps considered: email and calendar essential
  – Block advertising apps
• Issues: privacy, liability, accessibility, HIPAA compliance
• Multiphase migration begins Spring 2013
• Slides attached
Cloud Computing (Roxana Geambasu, CS)

- Computing paradigm in which data and/or computation is outsourced to a third-party massive-scale, multi-user provider on a pay-per-use basis.
- Examples: Amazon AWS, Google AppEngine, Microsoft Azure, ...
- Issues:
  - How easy to use?
  - How many applications supported?
– Cost for storage
– Cost for data access

• Should Columbia move to the Cloud?
• Should individual researchers move to the Cloud?
• Slides attached
Data Reproducibility Issues (Victoria Stodden, Statistics)

• **Serious problem:**
  – Researchers describe results but rarely provide data and code that produced them
  – How can fraud be detected?

• Funding agencies and journals concerned
  – NIH and National Cancer Institute recommending open code
  – NSF requires Data Management Plan
  – *Science* requires code submission

•
What should Columbia do?

– Provide more support for researchers

– University of Michigan provides technology guidance, access to computational infrastructure, and support

– CU’s Research Computing Executive Committee and a Shared Research Computing Policy Advisory Committee (SRCPA), chaired by David Madigan (Statistics) to address
Digital Humanities and Social Sciences Initiative

- New collaboration between: History, English, Comparative Literature, Economics, Computer Science, Statistics, ISERP, SIPA, Mailman, QMSS

- Current activities:
  - University Seminar on Big Data and Digital Scholarship, 2012
  - Heyman Seminar, 2012
  - Possible master’s program
Data Governance Update: ARC

• Single point of entry for all financial reporting and aid
  – Replaces AP/CAR and DARTS
  – Links directly to PeopleSoft
• New reporting capabilities: more flexibility in customizing reports
• Training challenges
Columbia App (Wei Yao)

- Links to
  - Campus events
  - Calendar
  - CLIO mobile app (permits library search, book renewal)
  - Alerts for free food on campus
  - Campus phone numbers
- Users can submit news items (moderated)
- Columbia history information
• Available from Apple Store
Research Match Website (Rebecca Sealfon)

- Matches professors with research project with students who want to work on them
- Launched March 2012
- www.ResearchMatch.ch
- Slides attached
New CourseWorks Project
October 2011
CourseWorks Transition Plan

- 4 term transition starting with Fall’11 academic term
- Transition 3,500 Courses, 3,100 Instructors, and over 25,000 Students
- Each transition term: 800 courses, ~ 800 instructors, ~ 3500 students
System Preparation for Transition

- New: URL, Logo
- Common Entry Point
- Content Migration tools
- Registration Feed
- Upgrade Hardware
# Current Semester Courses

### Fall 2011 Course Sites

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Students</th>
<th>Guest Accessible</th>
</tr>
</thead>
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<tr>
<td>INTC D5001.081.2011.3</td>
<td>SCI INQ &amp; DECISION MAKING</td>
<td>79</td>
<td>Not Applicable</td>
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<tr>
<td>BIOL W2501.006.2011.3</td>
<td>CONTEMPORARY BIOLOGY LAB</td>
<td>26</td>
<td>Restricted</td>
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</table>

Reflects Registrar changes through Oct-01-2011 01:12:00AM

### Collaboration Sites (not course-related)

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<thead>
<tr>
<th>Site Number</th>
<th>Site Title</th>
<th>Members</th>
<th>Guest Accessible</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADMN 1032.001.2007.3</td>
<td>ACADEMIC SUCCESS PROGRAM</td>
<td>91</td>
<td>Restricted</td>
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<tr>
<td>ADMN 1012.001.2007.2</td>
<td>Teaching Academic - for faculty mentoring</td>
<td>3</td>
<td>Restricted</td>
</tr>
<tr>
<td>SNDB A100.002.2003.1</td>
<td>CourseWorks DevTeam Communications Repository</td>
<td>18</td>
<td>Restricted</td>
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</tbody>
</table>
### Content Migration: From CW to New CW

#### Sections

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<tr>
<td>Introduction</td>
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<td></td>
<td>⚫ Intro to Site Info</td>
</tr>
<tr>
<td></td>
<td>⚫ Intro to Syllabus</td>
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<td>Yes</td>
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<td></td>
<td>⚫ Syllabus to Syllabus</td>
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<tr>
<td></td>
<td>⚫ Syllabus to Calendar</td>
</tr>
<tr>
<td>Lectures</td>
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<td>(only files attached to this section will be migrated)</td>
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<tr>
<td>Assignments</td>
<td>Yes</td>
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<td>(only files attached to this section will be migrated)</td>
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<td>Test &amp; Quiz</td>
<td>Yes</td>
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<td>Shared Files</td>
<td>Yes</td>
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<tr>
<td>Discussions</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>(only files attached to this section will be migrated)</td>
</tr>
</tbody>
</table>

**Copy Sections**
Transition: Progress Report

Transitioned Schools & Departments

- School of Public Health
- School of Dental Medicine
- School of Nursing
- School of Medicine
- School of Social Work
- A&S: Dept. of Anthropology
- A&S: Dept. of Statistics
- A&S: Univ. Writing Program
Transition: Progress Report

Activity Report Card

- 1200+ Active Courses
- 292 Early Adopters
- 200+ Content Migration
- 638 Courses with Syllabus
- 7,000 Sent emails
- 38,500+ Files Uploaded
- Over 13,000 Unique Log-ins
Transition Progress Report

Fall Term 2011 Original Goal = 800 Courses

Current As of 10/1/11

- <400 active courses
- 8,000 unique logins

Final for Fall Term 2011

- 1200+ active course
- 13,000+ unique logins

Start of Fall Term 2011

???
Who’s Next? Transition Spring 2012

- Schools
  - SIPA
  - Architecture
  - Journalism
  - SEAS

- Depts.
  - Arts and Sciences: All smaller departments

- Early Adopters
  - Barnard
  - Other: A&S Depts.

Additional 800 Courses

~ 800 Instructors

~ 3,500 Students
What’s Coming for Spring Term 2012?

Major Upgrade Dec’11
- Version upgrade
- User Interface improvements
- Additional hardware

System Integrations
- Library reserves
- Research guides
- Grade book – SSOL (May’12)

Administrative Access
- Hierarchy based access
- Edit or View content
What’s Coming for Spring Term 2012?

- ‘My’ Courses Page
  - Consolidate information
  - Course, Announcement, Calendar…

- Registration – content opening tools
  - Content – Syllabus, readings…
  - Open to all with UNI or Public

- Face book
  - View student pictures, search, groups
  - Students to upload profile

- Guest Access
  - Under investigation
Best Practices in New CourseWorks

Best Practice
- Course Content: Starting fresh; migration
- Review new tools: Collaboration, Communication
- Knowledge base at CCNMTL

Recommendations
- Post Syllabus in syllabus section
- Calendar: tests, assignment, meeting times
- Post announcements: course site & email

Standardization / Customization
- School based tool availability and order
- School policies, information and links
- Too much customization ??
Faculty Training Results

Medical Center
- 21 Workshops
- 181 Trained
- 40 Individual Consults
- 220 Total Instructors & TA’s

Morningside
- 12 Workshops
- 35 Trained

Social Work
- 10 Workshops
- 104 Trained
- 9 Individual Consults
- 113 Total Instructors & TA’s
### Student Training & Tools

#### Freshman Orientation
- Social Work: 350 students
- Public Health

#### Weekly Training
- Weekly training sessions
- Medical Center & Morningside campuses
- Students sign up/walk-ins

#### Tools
- > 35 Video Clips Library
- Quick Start Guides
- Frequently Asked Questions (FAQ’s)
- Downloadable Full Training guide
New CourseWorks Communication Plan

Audience
- Transitioning Schools/Departments
  - Faculty and Staff
  - Students
- Columbia Community
- Advisory Council
- CUIT, CCNMTL, Library Partners

Tools:
- Email campaign for transitioning schools
- Links to Existing CourseWorks and CUIT website
- Student orientation & focus group outreach
- Rolling information screens in Kent Hall
- New CourseWorks news blog just going live
What are Cloud Email Options?

- Email, calendaring, and collaboration (docs, chat, etc.)
- Google, Microsoft Office 365, others considered
Common Solutions Group: Email RFP

- Consortium of 30 top research universities
- Banded together to increase negotiating power
- Addressed common University concerns about privacy, data storage, etc.
Current Email/Calendar Services at Columbia

**CubMail aka Cyrus**
- 80,000 users; “free” basic email

**CUIT Outlook aka Exchange**
- 3,000 users; fee-based email and calendaring

**15 (or more) other email & calendar systems**
- Departmental email e.g. CUMC, General Counsel
- A few departments already using Google
30% of Columbia email users auto-forward all email to email systems outside Columbia

Stats as of May 2011. Does not reflect individuals using Gmail or other systems who do not explicitly forward their @columbia.edu mail to those systems.
Comparison of Google and Microsoft

Google

- Designed and built for **cloud-based** computing; available 7 years
- Extensive functionality and **modern** user interface
- **Preferred solution** by most students
- Enables **collaboration** via Google Docs
- **Robust calendar** including delegation and “office hours”
- Chat and voice/video **built into** the side bar of the email application

Microsoft Office 365

- New replacement to product based on **legacy software**; released to market in Summer 2011
- **Basic** functionality of Outlook web access
- **Not likely to sway** students from Google
- Document editing limited to **one user** at a time
- MS Outlook **desktop required** for calendar delegation
- **Limited** “extras”
Sampling of Academic Institutions Who Have Outsourced Some Email

Google

Microsoft
Live@edu or moving to Office365
Features in Scope for Google Implementation

Must-have Apps
Email, Calendar

Other Apps we hope to support
Docs, Groups, Sites, Talk, Mobile

Consumer Apps
Blogger, Maps, Picasa, Reader, Voice, YouTube

Blocking of Advertising Applications
Contract includes protections regarding…

• Privacy, data mining
• Subpoena notification
• Data transfer and storage
• Liability
Accessibility

- Collaboration = Everyone
- National Federation of the Blind
- Google efforts
- Legal requirement vs Aspirational goals
- Desktop clients for email and calendar
HIPAA Compliance – Later

- Health Insurance Portability and Accountability Act
- PHI: Private Health Information
- BAA: Business Associates Agreement
Potential Implementation Approach

Evolve toward Google as universal email/calendaring/collaboration solution for Columbia through multi-year phased migration

Start with Undergraduates
- Phase 1: 1,000 undergraduates – aggressively begin spring 2012
- Phase 2: Remaining 6,900 undergraduates – aggressively fall 2012

Potential: All Morningside Students – beginning spring 2013

Faculty and Staff – Under evaluation

HIPAA-Covered Schools, Individuals – TBD

*All subject to contract negotiations and implementation planning*
Cloud Computing: Benefits and Challenges

Roxana Geambasu
Assistant Professor in the CS Department
What Is Cloud Computing?

“It’s stupidity. It’s worse than stupidity: it’s a marketing hype campaign.”

Richard Stallman, Free Software Foundation founder

“I have not heard two people say the same thing about it [cloud]. There are multiple definitions out there of ‘the cloud’”

Andy Isherwood, HP’s Vice President of European Software Sales
Outline

- Historical view of cloud computing
- Current offerings
- Cloud benefits
- Cloud challenges
- Summary

One caveat: this talk is about cloud computing in general, not about Columbia-specific issues with cloud computing

- You may ask me about Columbia-specific needs, but you’ll have to give me full context
Outline

- Historical view of cloud computing
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Around 1995: The Web’s Scaling Challenge

- The Web and e-commerce were gaining popularity
  - E.g., in 1996 eBay grew from 41,000 to 341,000 users!

- Biggest challenge: How to scale to increased load?

- 1995 response: Big, expensive supercomputers
  - E.g., eBay used Sun E-10000 “supermini”
  - 64 processors @250MHz, 64GB RAM, 20TB disk
  - Price: ~$1M
1996: Clusters of Commodity Computers

- Berkeley idea: build scalable Web sites on top of many interconnected small, cheap machines
  - These networks are called clusters (or datacenters)
  - First demonstration: Inktomi

- All companies started to build and grow their own clusters
  - Like the early days of electricity, when everyone built their own generator
Early 2000s: The Management Challenge

- Managing big clusters is extremely difficult!
  - Hard to program distributed systems
  - Hard to build reliable and scalable systems
  - Hard to administer lots of machines
  - Hard to architect large networks

- A few select companies solved challenges by building primitives for programming & administering large clusters
  - Scalable and reliable storage: Amazon S3, Google Bigtable
  - Scalable computation systems: Google MapReduce
  - Performance diagnostic tools
  - Temperature regulators
  - ...
Companies had three valuable commodities:
1. **Expertise** for operating large datacenters at low cost
2. **Complex software** to help program/manage datacenters
3. **Enormous excess capacity** (due to peak-load provisioning)

Companies starting monetizing these commodities by renting them to outsiders on a **pay-for-what-you-use** basis

And so, “Cloud Computing” was born
Cloud Computing

My definition:

- Computing paradigm in which data and/or computation is outsourced to a third-party massive-scale, multi-user provider on a pay-per-use basis.

Examples:

- Amazon AWS: storage and computing
- Google AppEngine: Web hosting
- Microsoft Azure: storage and computing
- Google Apps: email, calendar, documents
- Salesforce.com: customer relationship management
- ...
Outline

- Historical view of cloud computing
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Amazon AWS

- **S3**: reliable and scalable distributed storage
  - Storage cost: $0.10 per GB-month
  - Access cost: $0.10 per 1 million I/O requests
  - Network cost: $0.12 per GB out of Amazon, $0 in/within Amazon

- **EC2**: rent virtual machine (VM) instances to run any software on an OS of your choosing
  - CPU cost: $0.085-2.00 per CPU-hour
  - Network cost: as above

- Example use for Columbia:
  - Host Web site, email server on Amazon EC2
  - Back up data to Amazon S3
Example: Using EC2

- Bundle apps, libraries, data into Amazon Machine Image (AMI)
- Upload AMI to Amazon S3
- Use Web console to configure security, network access for VM
- Choose OS, start VM instances based on your AMI
- Monitor & control VMs via Web console or APIs
Google AppEngine

- Web hosting infrastructure, exclusively targeted at Web apps
  - Not suitable for general purpose computing as with AWS

- You create your Web site and submit the code to Google

- Google will take care of the rest:
  - Web server infrastructure
  - Reliable storage
  - High availability (i.e., restart failed servers)
  - Load balancing

- Example use for Columbia:
  - Run Web site on the AppEngine
Example: Using AppEngine

- Download AppEngine development kit
- Develop Web site code locally with kit (Python or Java)
- Submit code to Google
- View logs, data, usage from the Web console
Google Apps for Businesses

- Hosted Gmail, calendar, docs reachable under your domain
  - E.g.: gmail.cs.columbia.edu

- Example benefits for Columbia:
  - Sharing, collaboration
  - Efficient access to emails, calendars, docs from anywhere in the world
  - Reliability and high-availability
How Do These Compare?

- Key differentiators: **level of abstraction** presented to the developer, which trades either flexibility or convenience.

**Flexibility**
- Minimal abstraction
- Minimal management of resources
- But supports any app

**Convenience**
- Highly abstracted
- Highly managed
- But supports only a few apps

Any other cloud offerings you might be interested in?
Outline

- Historical view of cloud computing
- Current offerings
- Cloud benefits
- Cloud challenges
- Summary
Cloud Benefits

- **Quality-of-service benefits:**
  - Scalable and reliable building blocks and applications
  - In some sense, increased reliability (geographic replication)
  - In some sense, increased security (let experts configure)

- **Economic benefits:**
  - Lower costs due to economies of scale
  - No up-front hardware costs
  - No overprovisioning

- **Next:** *Is moving to the cloud worth it purely for economics?*
  - Results and graphs are taken from a techreport/talk by Radu Sion, Stony Brook (I did *not* validate them!)
Scenario: Columbia Moves to the Cloud

Columbia’s network

One or more servers: email, web site, courses, grant management systems, ...

Internet
Scenario: Columbia Moves to the Cloud

Columbia's network -> Clouds

Internet

E.g.: AppEngine for Web site, Google Apps for email, …

Question: Which is cheaper?
Economies of Scale

- Clouds’ advanced management expertise and software drive computing costs down
  - Storage, computing, networking costs

- Example cost savers in the cloud:
  - Custom hardware
  - High CPU utilization
  - Efficient cooling
  - High power usage efficiency
  - Preferential network deals
  - …
Economies of Scale: CPU Costs

![Bar chart showing CPU costs for different datacenter sizes](image)

- **Small datacenter**
  - Number of servers: 10
  - Cost: 7.11 picocents

- **Medium datacenter**
  - Number of servers: 50
  - Cost: 26.02 picocents

- **Large datacenter**
  - Number of servers: 5000
  - Cost: 4.83 picocents

- **Extra-large datacenter**
  - Number of servers: 50000
  - Cost: 0.58 picocents

1 picocent = $10^{-14}$ USD
Economies of Scale: CPU Costs Breakdown

Operational costs (admins) are highly optimized.
So, Is It Worth It?

CPU: Yes
Storage: Yes
Network: Not always
So, Is It Worth It?

Columbia’s network

CPU: Yes
Storage: Yes
Network: Not always

1 CPU cycle
6-27 picocents

1 bit storage/year
6 picocents

1 transferred bit:
~4,500 picocents

Internet

1 CPU cycle
0.58 picocents

1 bit storage/year
5.3-6 picocents
So, Is It Worth It?

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Columbia’s network

Internet

1 CPU cycle:
- 0.58 picocents

1 bit storage/year:
- 5.3-6 picocents
When Is Moving to Cloud Worth It?

- When you’re computing a lot and transferring little
- When you’re accessing a lot from outside Columbia’s network
- When you value other benefits of clouds…

Intuitive examples:
- Backup might be worth it, if not frequently accessed
- Cloud-based file system is probably not worth it
- Email might be worth it, since users don’t access much
- Web site might be worth it, since intuitively there might be more external users than internal ones (?)

Bottom line: back-of-the-envelope calculations are needed if economics is a major incentive for cloud move
Outline

- Historical view of cloud computing
- Current offerings
- Cloud benefits
- Cloud challenges
- Conclusions
Challenges

**CLOUD-RELATED ISSUES THAT HAVE IT PROS CONCERNED**

- Security: 53%
- Performance: 33%
- Control: 31%
- Vendor lock-in: 30%
- Support: 25%
- Configurability: 18%
- Speed to activate new services or expand capacity: 17%

% indicating they’re very concerned about these issues

Data: *InformationWeek Analytics* Cloud Computing Survey of 172 business technology professionals considering or using cloud services

Cloud Control, InformationWeek Reports, 2009
Clouds Weaken Data Control and Transparency

- Does the cloud retain the data for longer than you wish?
- How control do you have on your data’s privacy?
- Does the cloud respond to subpoenas with your data?
- Where is the cloud storing my data?
- How reliably is it storing it – how many replicas?
- What do you do if (when) cloud provider goes bankrupt?
- Does the cloud enforce all the legal policies you are required to comply with (SOX, HIPAA)?
- Upon a cloud failure, you are powerless

- Lots of research on these issues (mine included), but few practical (albeit costly) solutions
  - Some of these may only be enforceable by law
Outline

- Historical view of cloud computing
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- Summary
Summary

- Cloud computing brings some clear advantages
  - Robust building blocks to construct scalable systems
  - Simplified management, fewer headaches

- Clouds can be extremely profitable for certain applications
  - But might be expensive for others, depending on footprint

- Huge challenges arise, particularly with respect to degree of control and transparency

- In my opinion, clouds will happen, it’s just a matter of time and legislation
  - Just like the electricity grid happened
My Question to You

- What are Columbia’s needs and worries?
Acknowledgements

Slides:

- History slides inspired by a talk by Armando Fox, UC Berkeley

- Economics slides & results from talk by Radu Sion, Stony Brook
  - [http://www.cs.sunysb.edu/~sion/research/cloud.costs.04x.pdf](http://www.cs.sunysb.edu/~sion/research/cloud.costs.04x.pdf)

- Some slides inspired by a talk by Anh M. Nguyen, UIUC

Images:

- EC2, AppEngine console screenshots are from (respectively):
  - [http://javascript.training.free.fr/AppEngine/appengine.html#landing-slide](http://javascript.training.free.fr/AppEngine/appengine.html#landing-slide)

- Columbia network picture is from:
  - [http://www.functionx.com/networking/Lesson01.htm](http://www.functionx.com/networking/Lesson01.htm)
The quick and easy way for students and professors to find successful project collaborations
Problem

- **Students have trouble finding appropriate projects**
  - No centralized mechanism
- **Professors frequently dissatisfied with students in their labs**
  - Too many applications from less qualified students
  - Too few applications from more qualified students
  - Lab website information time-consuming to maintain
- **Columbia**
  - 27,600 students
  - 3,600 faculty
High Throughput Sequencing for Comprehensively Cataloging Variants

While most of the current genetic data is based on SNP markers, DNA sequencing has been increasing in throughput and cost-effectiveness out-pacing Moore's law. We have been developing and applying computational methods to tackle this torrent of sequence data. Specifically, we have refined models of genomic coverage in worm resequencing data, observing they fit a Gamma distribution, rather than a Poisson model. We further developed a novel method for sequencing of DNA from pools of individuals. The method designs overlapping pools, so that an individual carrier of a discovered variant can be traced through the intersection of such pools. Error Correcting Codes make such pool designs robust to experimental and statistical error. Read more

Somatic vs. Germline Genetic Variation and Its Effect on Cancer

Cancer is a genetic illness of cells. Somatic lineages suffer loss and gain of parts of the genome. As somatic copy number changes occur randomly, but may be sometimes selected for in tumorigenesis, we are investigating the allele specificity of this selection, i.e., the connections between an individual's germline genotype and the observed copy number changes in the tumor's somatic genotypes.

Contact person: Ninad

A word about updates and backward compatibility: Ideally, this page would be always up to date. However, in practice it is overhauled on occasion, and then left as it is. During the current update (Oct. 2008), I found it refreshing, humbling and overall educating to reflect on my research interests as I wrote them down in August 2006.
Project contact person: Ninad

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ResearchMat.ch Website

- Centralized, searchable Columbia University project listing
- Professors can update, delete projects
- Launched March 14, 2012
- 40 projects in 8 departments
- 262 registered users
- 1,117 unique visitors
ResearchMat.ch Alpha

We're a quick and easy way to match students and professors for the most successful project collaborations.

Check it out! »

Winner: Best Business Model at Columbia Devfest 2012!

Why Us?
Students don't spam professors about projects, and professors get quality students. Students, go ahead and search for your dream opportunity. Professors, make projects visible to the best students all over the university and get the talent you've been looking for. Everybody wins.

Peer Advising
Want us to add something you're interested in? Not sure what to apply for? We work closely with faculty and can address any questions you might have. Let us know at ras2198@columbia.edu.

Latest Project
Research in studying the evolution of videos on YouTube and other depositories, by tracing the recurrence of shots and frames "borrowed" from prior videos. Additionally, some research in the conce...

View details »
Find Your *Dream* Job.

## Video Understanding

Research in studying the evolution of videos on YouTube and other depositories, by tracing the recurrence of shots and frames "borrowed" from prior videos. Additionally, some research in the conceptual categories of visual objects and events that can be learned--particularly since classifiers are easily confused if the training examples do not overlap in semantics (e.g., truck versus bus) but overlap in visual appearances.

## Sports Analytics

Sports Analytics Research at Columbia Business School
- **When:** 35 hrs/week during summer, start immediately 8-15 hrs
- **Compensation:** $12-18/hr depending on background
- **Faculty Advisor:** Casey Ichniowski, Columbia Business School

- **Job Duties:** Data Cleaning, Data Visualization, Statistical Analysis, Database Management
- **Description:** Empirical research in sports economics and player/team performance metrics. Opportunities to do server side scripting and front end design. Build web applets and interactive graphics to analyze data. Experience in computer programming and/or statistical packages is VERY desirable.
- **Background:** Undergraduate (preferably undergraduate) with strong GPA and SAT scores. Looking for applicants with science/technology, or a strong mathematical/quantitative background.

## Statistics

- **5-15 hours/week**
- **$12-18 Per Hour**
Kichwa Sustainable Forest Management, Earth and Environmental Sciences
Mariana Vergara, Organization & Leadership

Research Area
Multidisciplinary

Commitment
Contact Us

Prerequisites
We will be training the participants, please contact us for more information

Compensation
Volunteer

Contact
miv2105@columbia.edu

Summary

This initiative aims to build upon and strengthen the members of the Kichwa community to be leaders of sustainable forest management in their region, inspiring others to follow in their footsteps. This initiative is designed in three stages: 1) Survey of the land, giving the Kichwua community the legal rights to own their lands; 2) Eco-tourism and Natural Medicine initiative; giving the Kichwua community a livelihood; and 3) World Dignity University (WDU) to establish a branch at the Kichwua communities. This sustainable way of preserving the rainforest is through the entrustment of the Kichwua community. Currently, the Constitution of Ecuador protects indigenous people, the Amazon rainforest and their rights. But, unfortunately these indigenous populations do not know how to interact with the current system in order to preserve the Amazon rain forest.

How: As argued by Heron and Reason (1997, p. 283) "having a critical consciousness about our knowing necessarily includes shared experience, dialogue, feedback, and exchange with others." Through action reflection collaborative inquiry, we are looking for ways to identify how to develop this initiative. This type of collaborative action inquiry is co-inquiry.

In order to deal with the mental demands of modern life, adults thinking needs to continue to evolve through higher level of consciousness. All of us (indigenous people, scholars, students, and practitioners) to co-create a sustainable mechanism to protect the environment.

Where: In the Ecuadorian rain forest, we will begin with a pilot with Indigenous communities.
### New project

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- Comprehensive, official matching system for on-campus projects and jobs available to Columbia students
  - OK Cupid-like suggestion algorithms
  - Easily searchable by criteria important to students
  - Not only for academic research
- Efficient filter of student applicants
- Automatic reminders to update projects
- Partnerships with as many Columbia groups as possible
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Long-term goals

- Expand to other universities to facilitate inter-institutional collaboration
- Professors have many dormant, unfinished projects. Matching labs with one another may prevent duplicate research efforts and allow a higher percentage of projects to become publishable
Team and Established Partnerships

- Rebecca Sealfon, M.S. 2012, Computer Science.
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- Ryder Moody, B.S.E. 2014, Computer Science.
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- Alex Poon, former intern at OMGPOP and Con Edison,
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- Yong Kwon, M.B.A. 2013. ykwan13@gsb.columbia.edu

Current Sponsors: IEEE, ACM
What the Senate can do

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  - Senate logo on website
  - ResearchMatch as a recognized Senate initiative

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- Please tell other students about ResearchMatch