The Market for Intellect

a.k.a.

What should I learn next? Discovering economically-rewarding education paths

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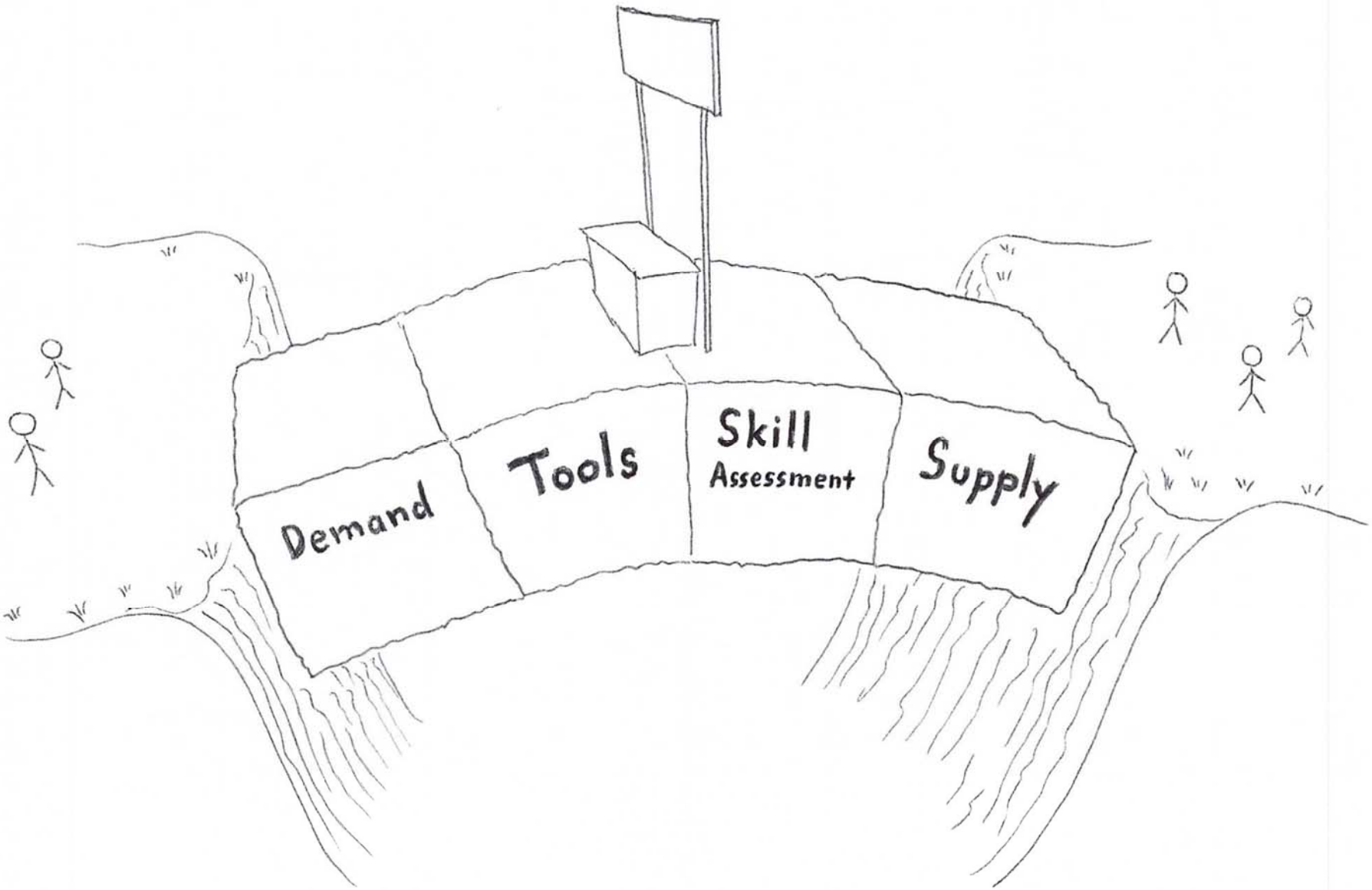
oDesk Research

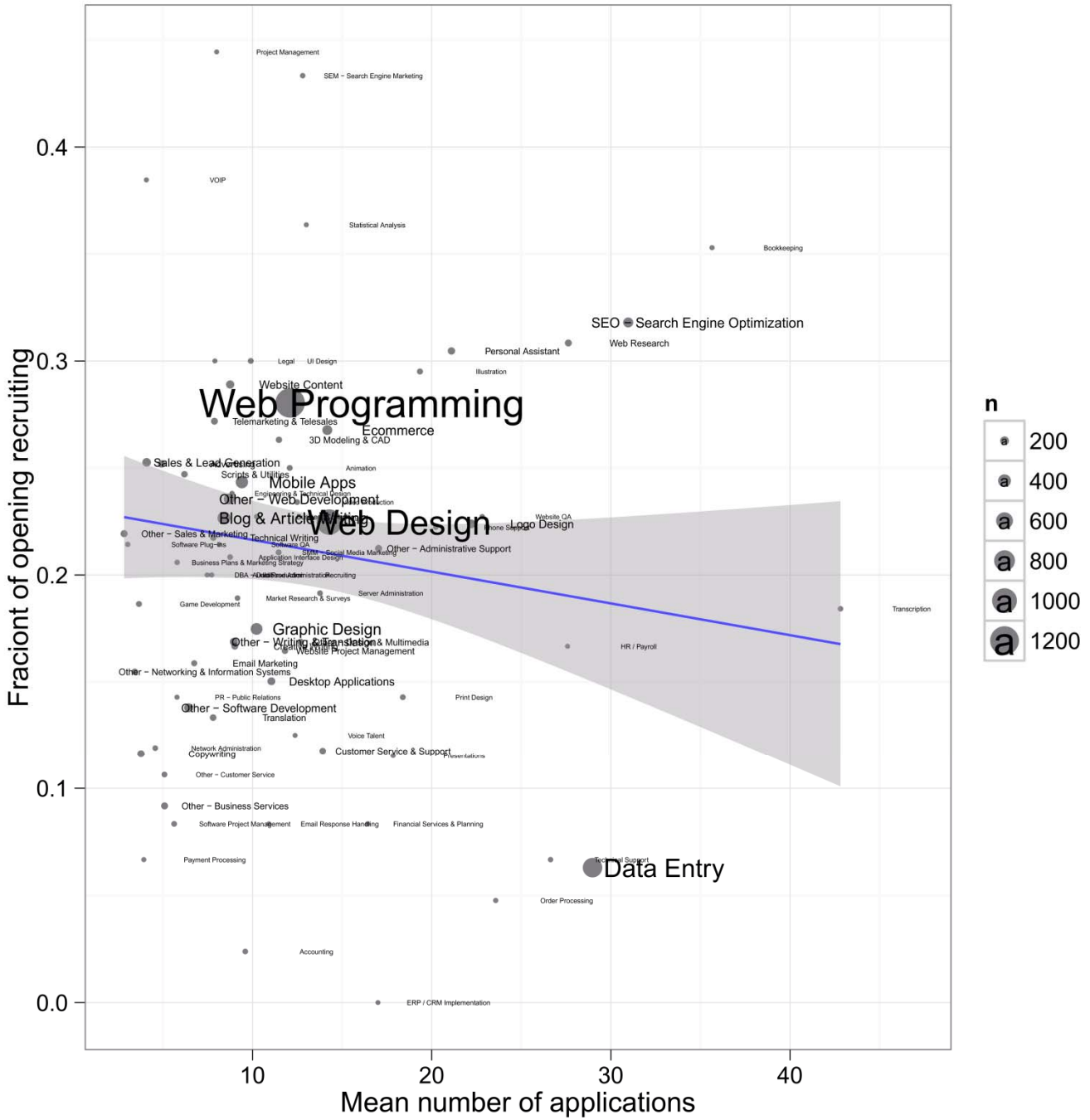
Stern School of Business, New York University

Warning: Description of research in progress follows. Those offended by obvious mistakes are advised to leave the room


Demand
Tools
Skill
Assessment
Supply

The (business) problem

- Demand does not match supply
- Oversupply of **basic** skills
- Demand for ***skilled*** workers exceeds supply


Fraciont of opening recruiting
Mean number of applications
0.0
0.1
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200
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600
800
1000
1200
Project Management
SEM – Search Engine Marketing
VOIP
Statistical Analysis
Bookkeeping
SEO – Search Engine Optimization
Web Research
Personal Assistant
Legal
UI Design
Illustration
Website Content
Web Programming
Telemarketing & Telesales
Ecommerce
3D Modeling & CAD
Sales & Lead Generation
Animation
Scripts & Utilities
Mobile Apps
Other – Web Development
Blog & Article Writing
Web Design
Website QA
Logo Design
Other – Sales & Marketing
Technical Writing
Software Plug-ins
Other – Administrative Support
Business Plans & Marketing Strategy
Recruiting
Server Administration
Market Research & Surveys
Transcription
Game Development
Graphic Design
Other – Writing & Translation
Multimedia
HR / Payroll
Website Project Management
Email Marketing
Other – Networking & Information Systems
Desktop Applications
PR – Public Relations
Print Design
Other – Software Development
Translation
Voice Talent
Network Administration
Copywriting
Customer Service & Support
Other – Customer Service
Other – Business Services
Software Project Management
Email Response Handling
Financial Services & Planning
Payment Processing
Data Entry
Order Processing
Accounting
ERP / CRM Implementation

Prices fix everything, right?

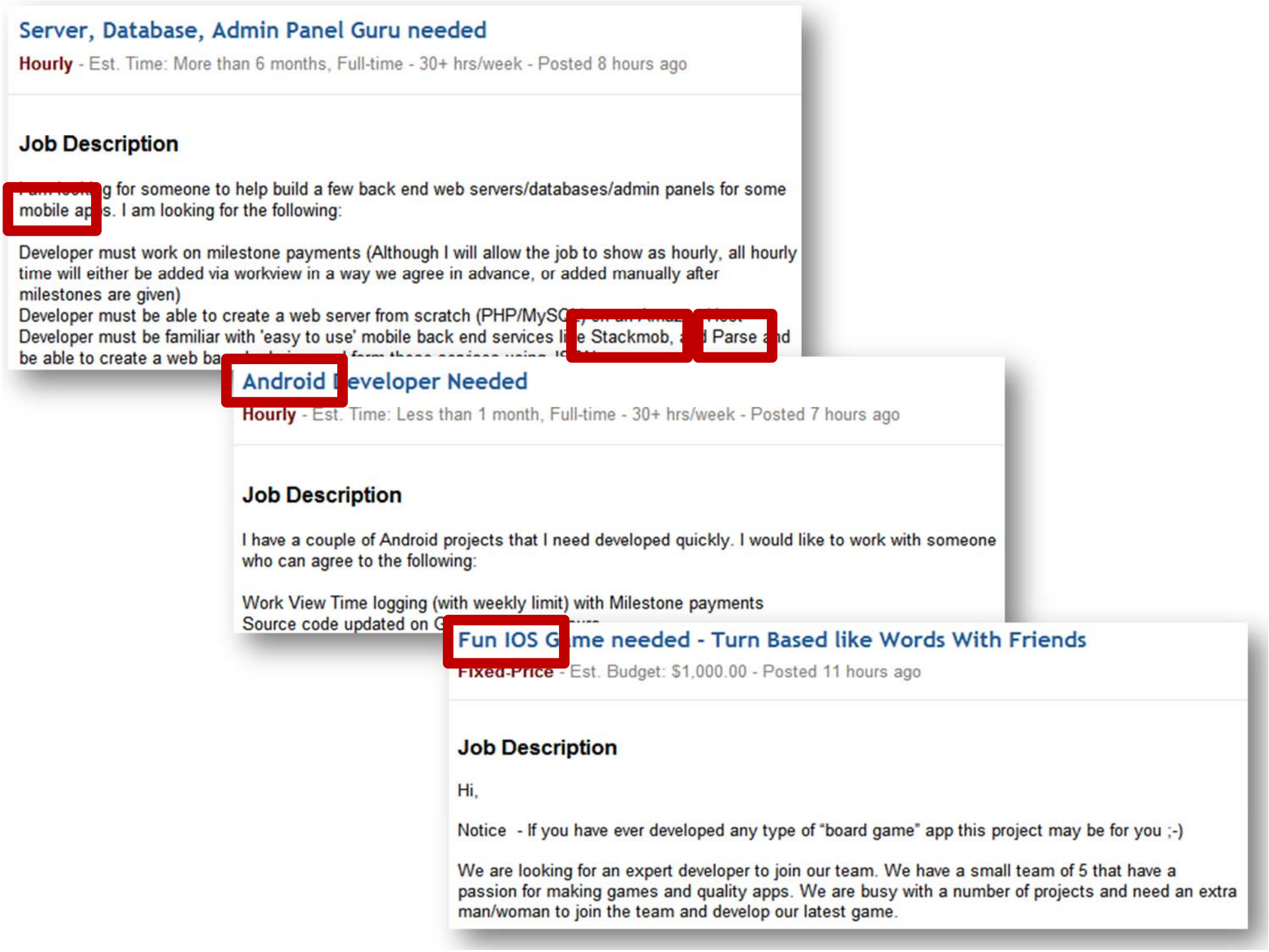
- Marketplace not a closed system
- Unmet demand will go elsewhere
- Unmet supply will go elsewhere

Marketplace’s best interest

Get contractors to learn new skills

Question #1

What skills are in demand?



Server, Database, Admin Panel Guru needed

Hourly - Est. Time: More than 6 months, Full-time - 30+ hrs/week - Posted 8 hours ago

Job Description

g for someone to help build a few back end web servers/databases/admin panels for some mobile ap s. I am looking for the following:

Developer must work on milestone payments (Although I will allow the job to show as hourly, all hourly time will either be added via workview in a way we agree in advance, or added manually after milestones are given)
Developer must be able to create a web server from scratch (PHP/MySQ
Developer must be familiar with 'easy to use' mobile back end services li e Stackmob, a d Parse a d be able to create a web ba

Android D eveloper Needed

Hourly - Est. Time: Less than 1 month, Full-time - 30+ hrs/week - Posted 7 hours ago

Job Description

I have a couple of Android projects that I need developed quickly. I would like to work with someone who can agree to the following:

Work View Time logging (with weekly limit) with Milestone payments
Source code updated on G

Fun IOS G me needed - Turn Based like Words With Friends

Fixed-Price - Est. Budget: $1,000.00 - Posted 11 hours ago

Job Description

Hi,

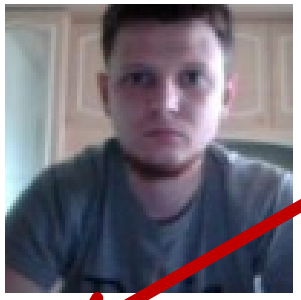
Notice - If you have ever developed any type of "board game" app this project may be for you ;-)

We are looking for an expert developer to join our team. We have a small team of 5 that have a passion for making games and quality apps. We are busy with a number of projects and need an extra man/woman to join the team and develop our latest game.

Controlled Skilled Vocabulary

http://81.171.104.157/wikisyno/index.php?action=search

Worker Skills



Michael Arshinov

J2EE D2+ level dev., Android dev., web-designer, selenium, glassfish

$33.56/hr

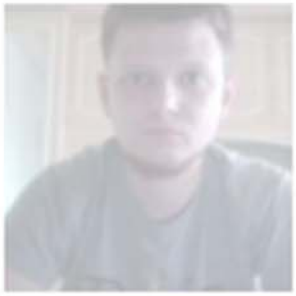
(4.89)

jee | xhtml | database-modeling | android-development | jboss | glassfish | ejb | jquery | selenium | spring-framework | apache-struts | web-services | hibernate | jasperreports

Self-selected and entered

Question #2: Skill Assessment

But are contractors truthful?



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English Skills/Grammar: Basic grammar knowledge

Example question:

It is not only important to be on time, _____ courteous when replying to colleagues.

(a) but is it also important to be

(b) but also is it important being

(c) but it is also important to be

(d) but important it is also to

Qualification Task #1: Business listing verification

- **For a specific University name and department, what are the first three names of professor that appear on webpage**

- First names of all professors
- Last names of all professors
- Position titles of all professors

Qualification Task #2: Business listing verification

- **For various non-profit companies, find the CEO, Chairperson of Board, and other contact info**
- First and last name of Board
- Position titles of all professors

Predictive model for success in the marketplace

- Time on tests predictive of time required for actual tasks
- **However,** skills tests do not work as well as simply measuring performance on past work
- So, we want tests that are more like “real” tasks…

it is time to draw! you'll be given 5 minutes to draw a random word

I'm ready to draw!

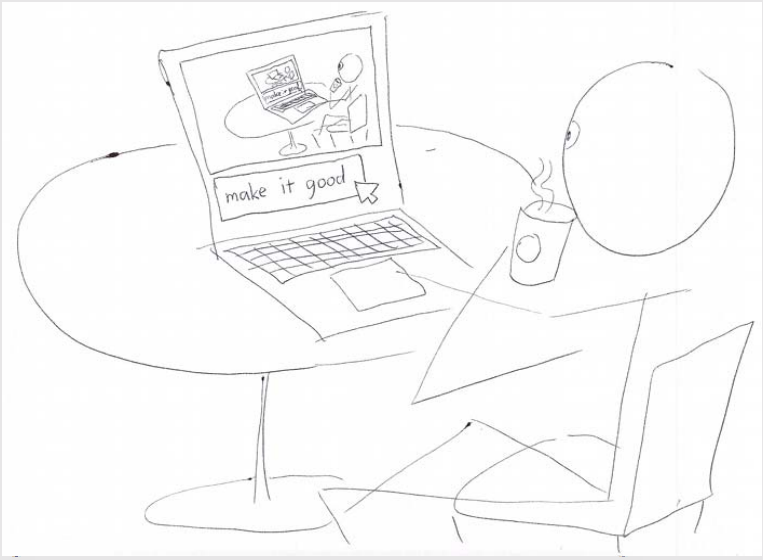
not yet, I'd rather vote some more...

draw a **home**. time left: 4:41

pencil eraser clear

submit

Which artist would you hire?



skip »

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Which artist would you hire?

skip »

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Which artist would you hire?

skip »

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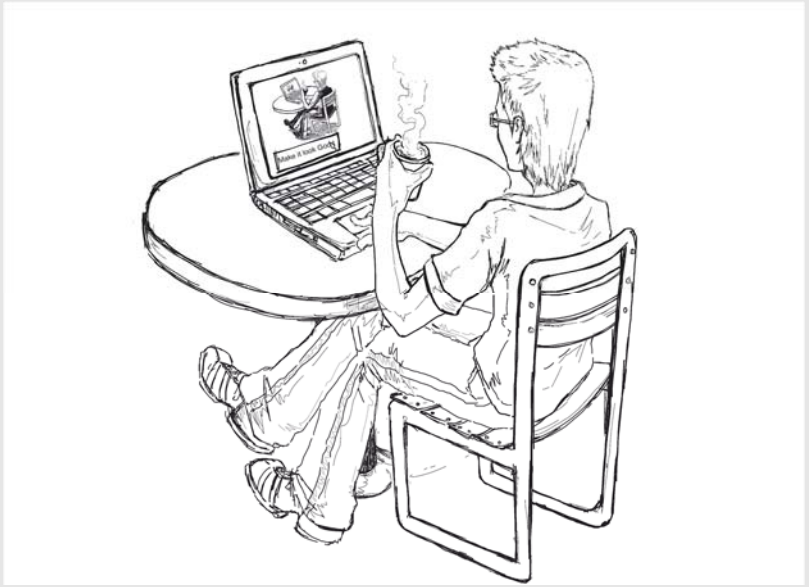
Which artist would you hire?



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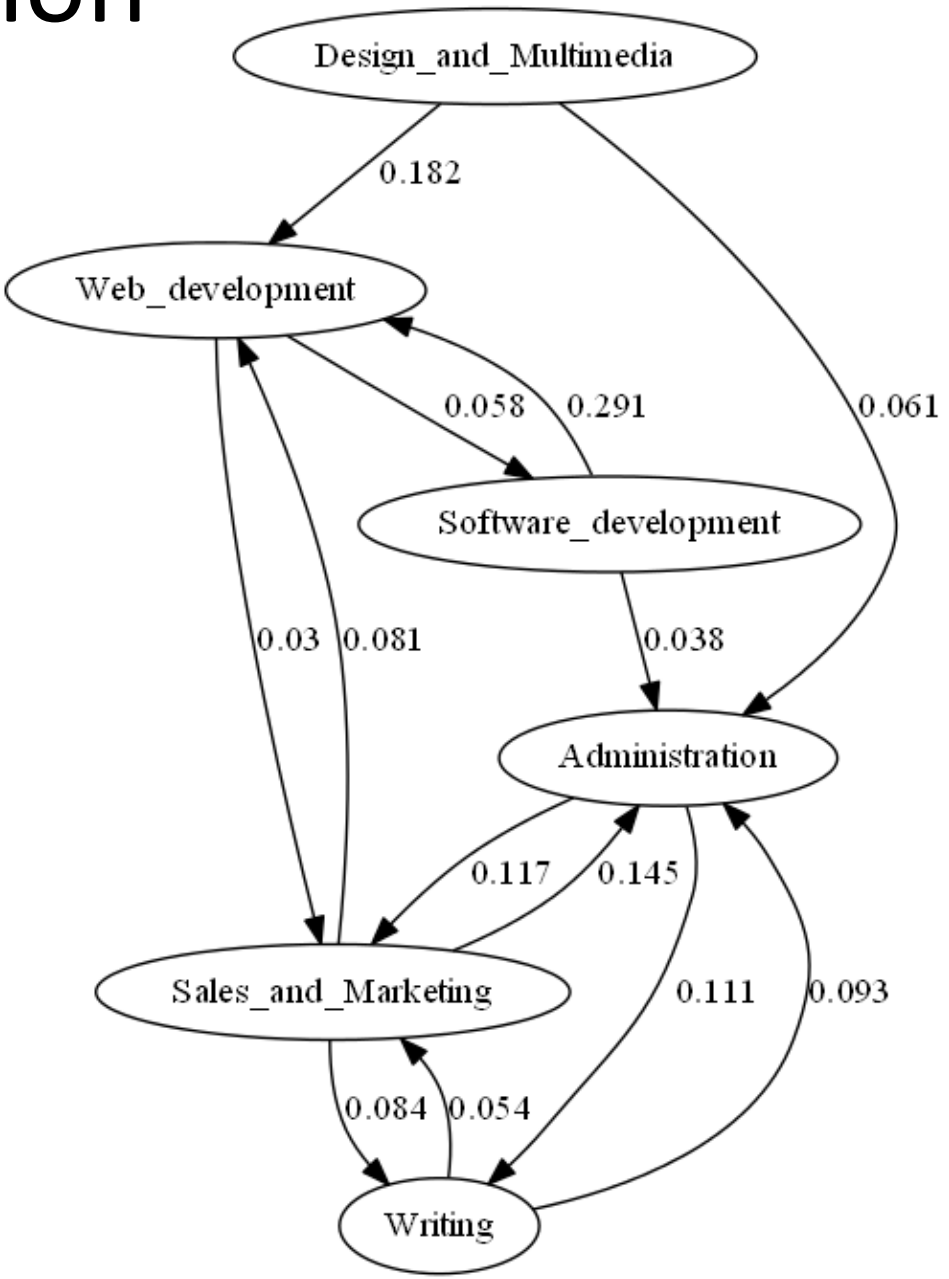
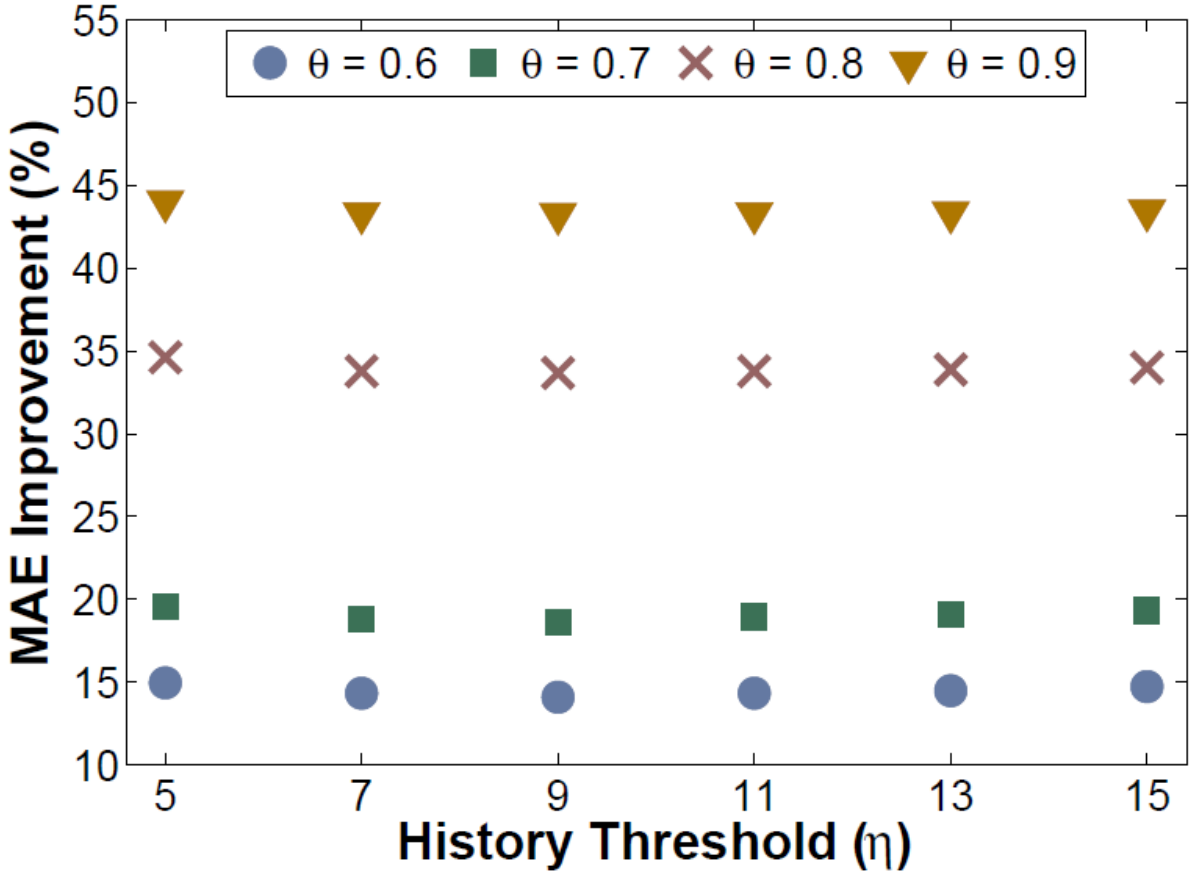
Across-task Reputation

- What is the affinity across types of tasks?
- If someone is good in sales, what do we know about their writing? About web development?



Results



- Knowing type of prior tasks leads to better performance estimates
- 35-45% improvement in future performance prediction

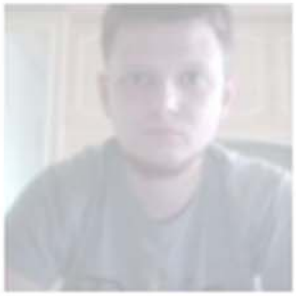
Skill-specific Training

- For "KPO"[(*)] tasks:
  - General history sufficient
  - *"A good admin is a good writer [when self-selected]"*

- For technical tasks:
  - Past performance in tasks with similar skill requirements is predictive

Question #3

What job streams(*) are best for each contractor?



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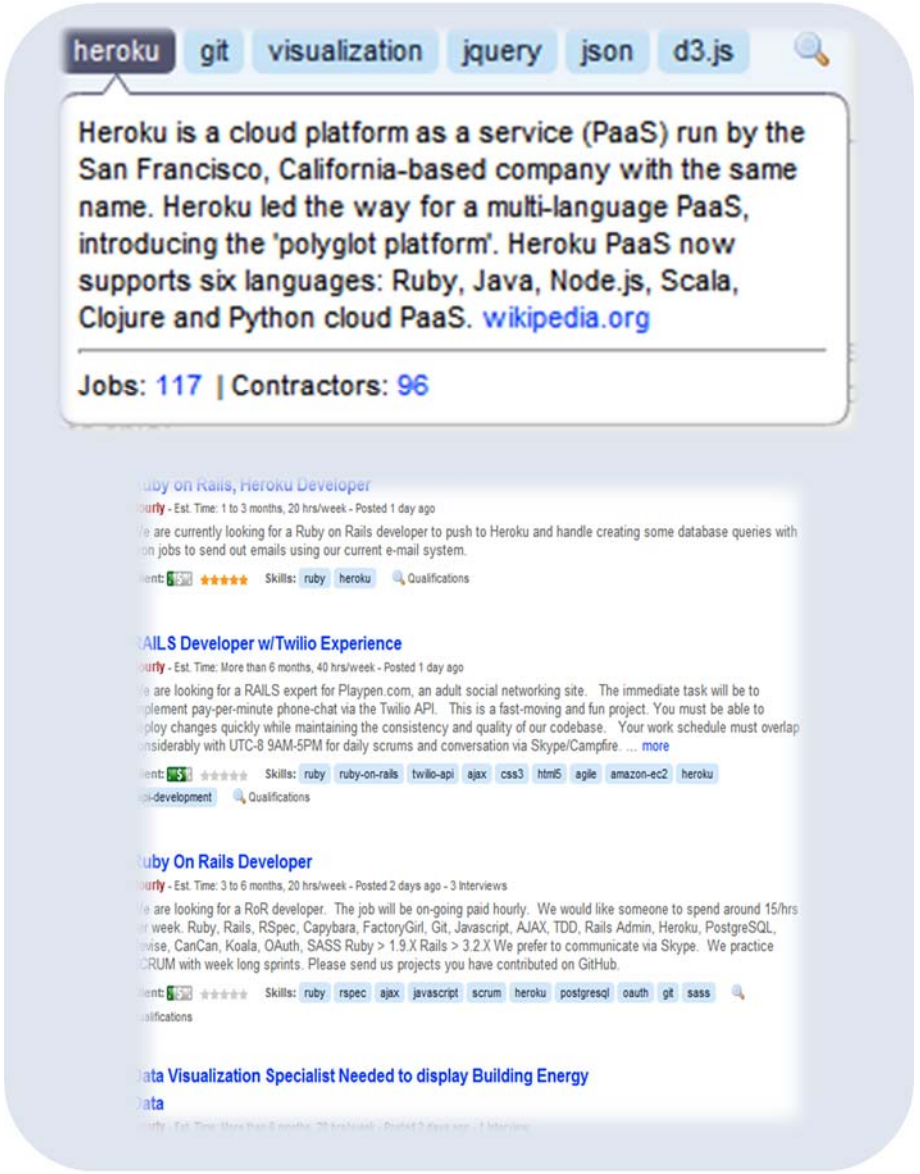
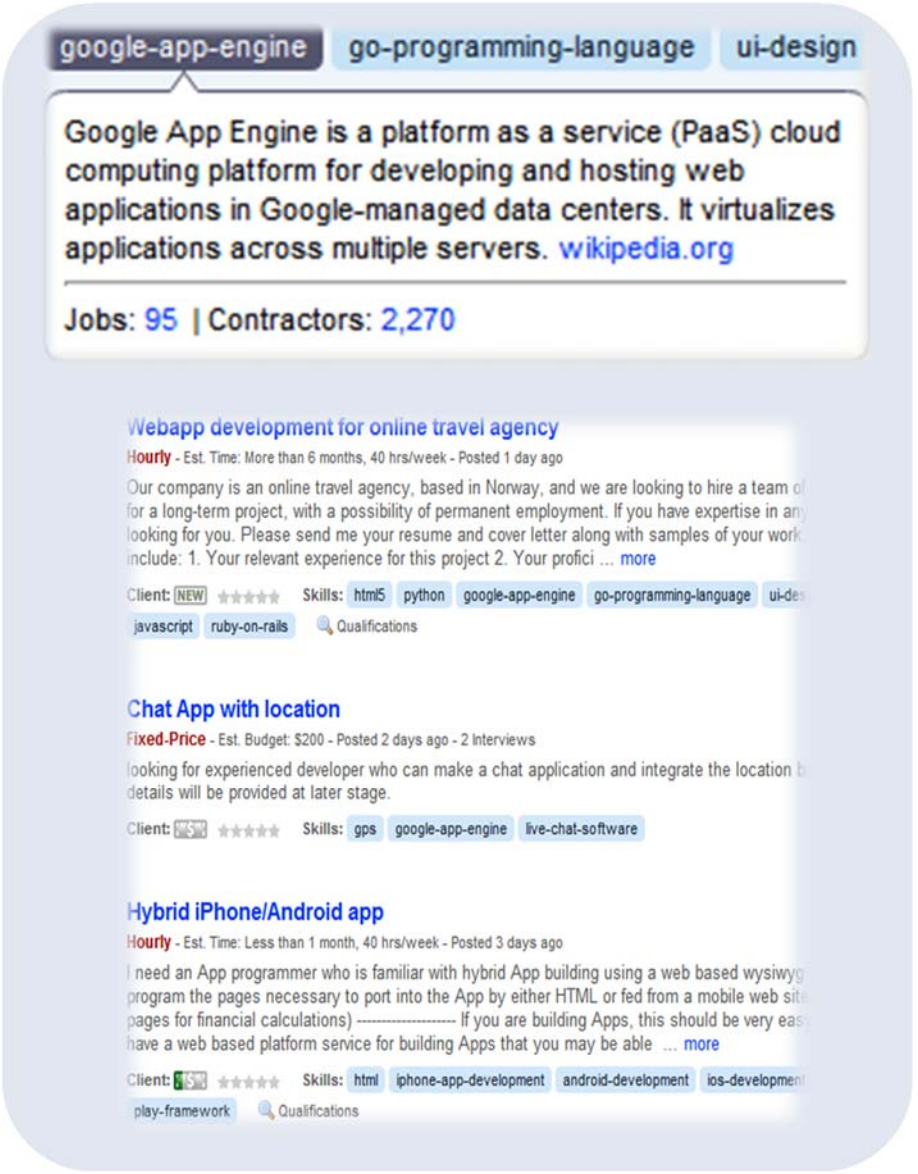
(*) Individual jobs fill quickly, and queries repeat

Utility of Skill/Job Stream



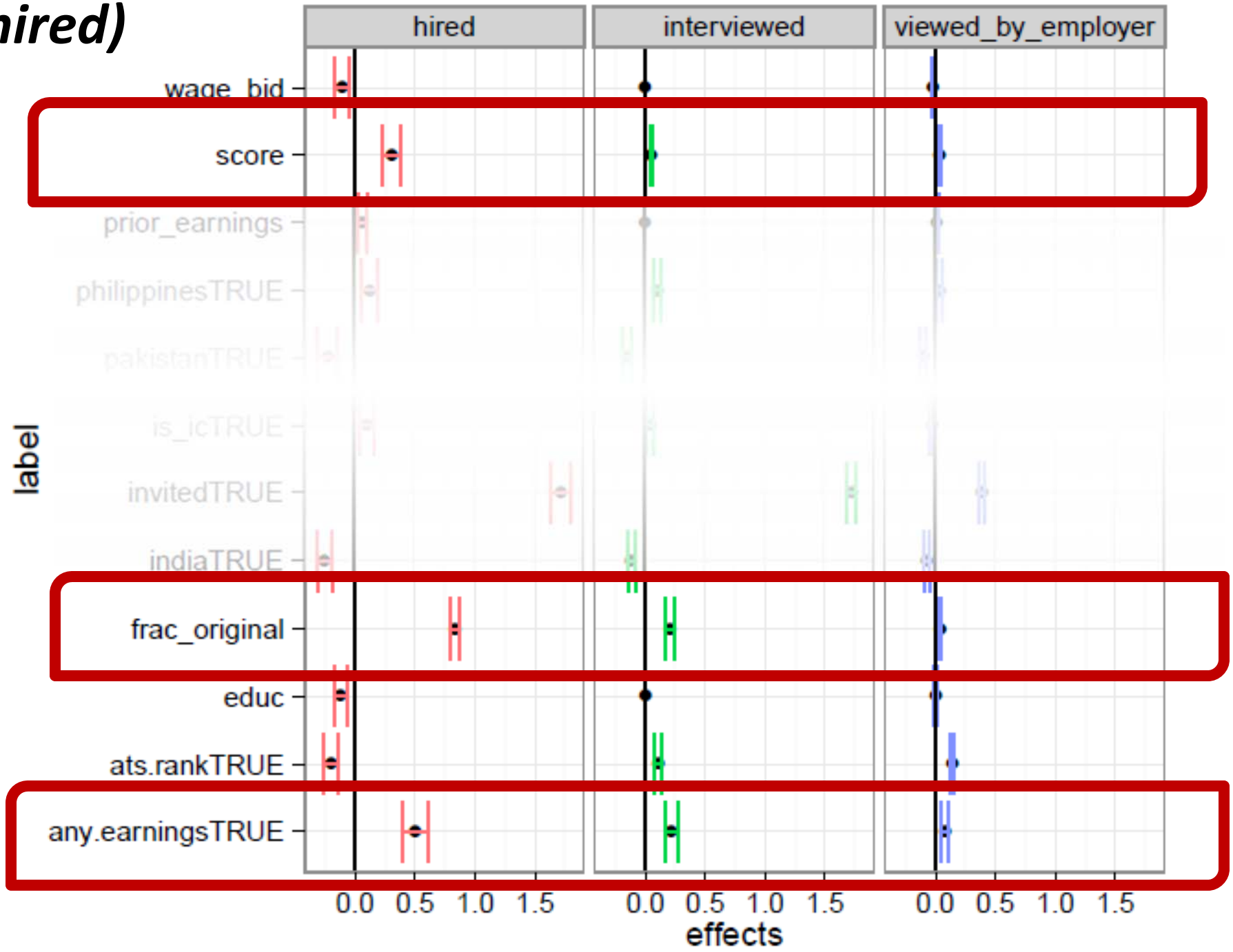


Utility of Skill

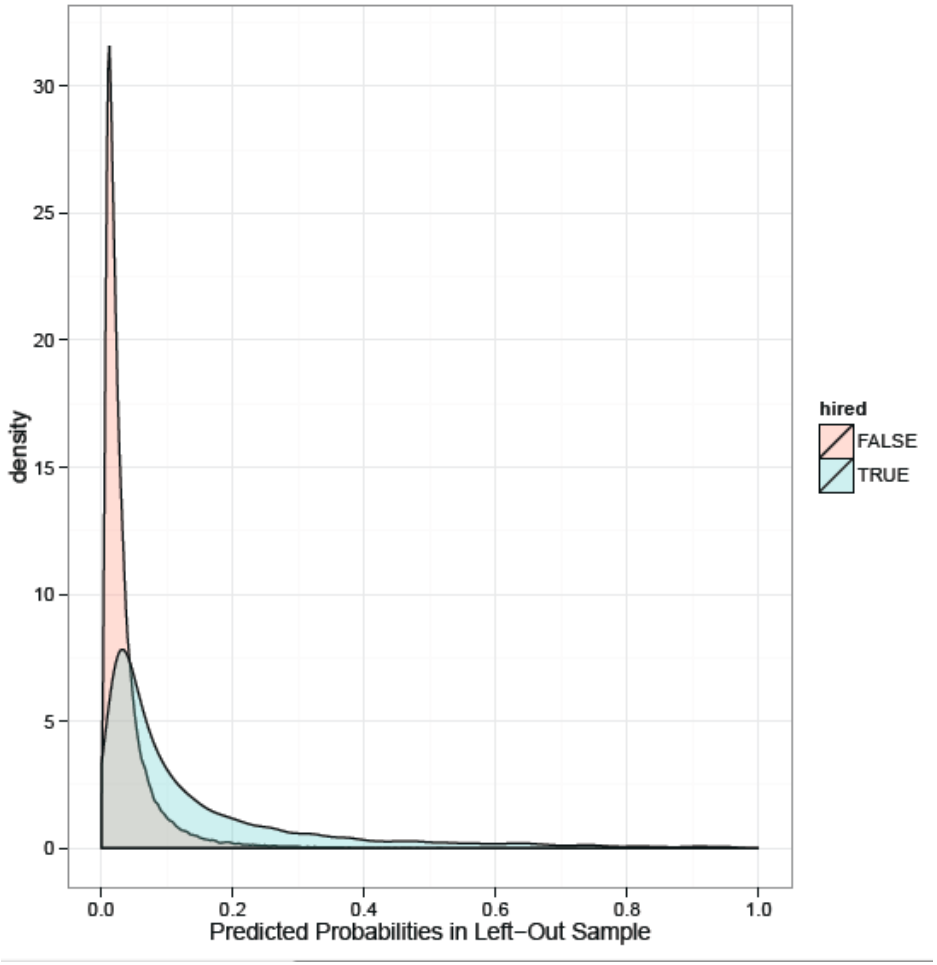
Market | Market | Contractor | ?

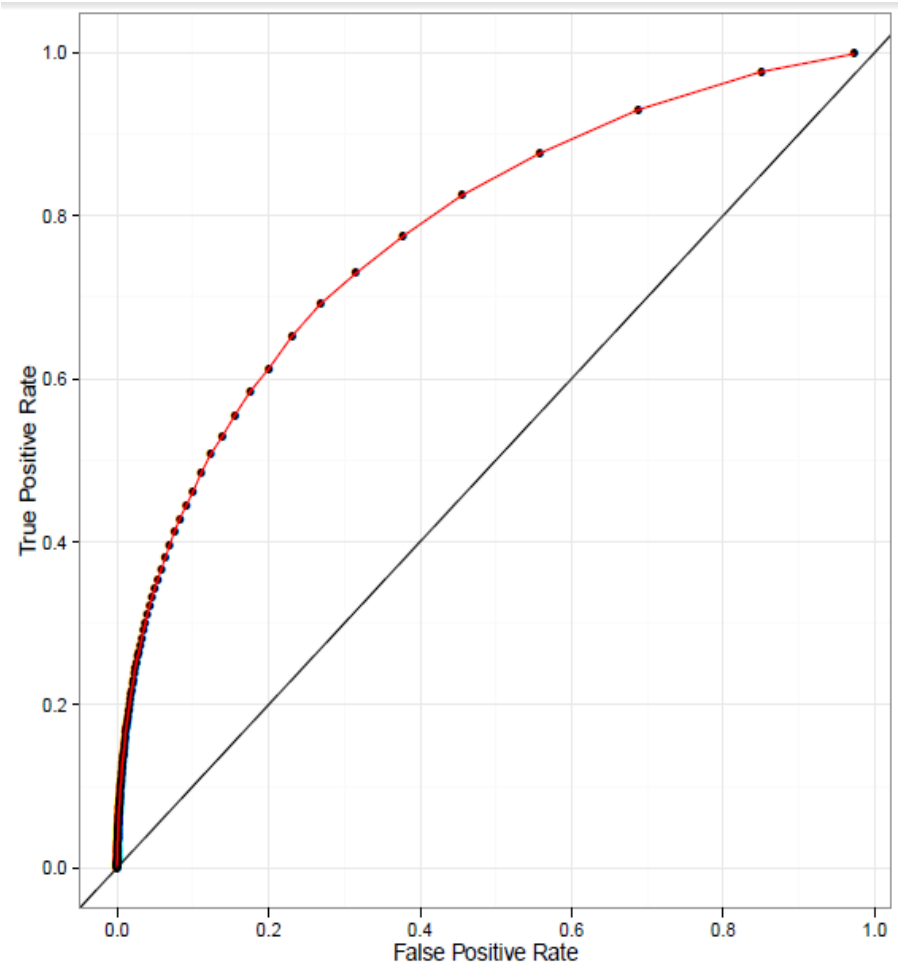
$$U = F(Jobs, OfferedRate, AskingRate) \times Pr(hired)$$

Pr(hired)


hired
interviewed
viewed_by_employer
wage_bid
score
prior_earnings
philippinesTRUE
pakistanTRUE
is_icTRUE
invitedTRUE
indiaTRUE
frac_original
educ
ats.rankTRUE
any.earningsTRUE
label
0.0
0.5
1.0
1.5
effects

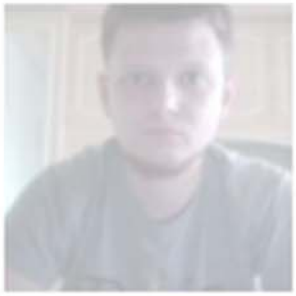
Pr(hired)


density
30
25
20
15
10
5
0
0.0
0.2
0.4
0.6
0.8
1.0
Predicted Probabilities in Left−Out Sample
hired
FALSE
TRUE


True Positive Rate
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
False Positive Rate

Question #4

What skills (if any) should a contractor ***learn***?



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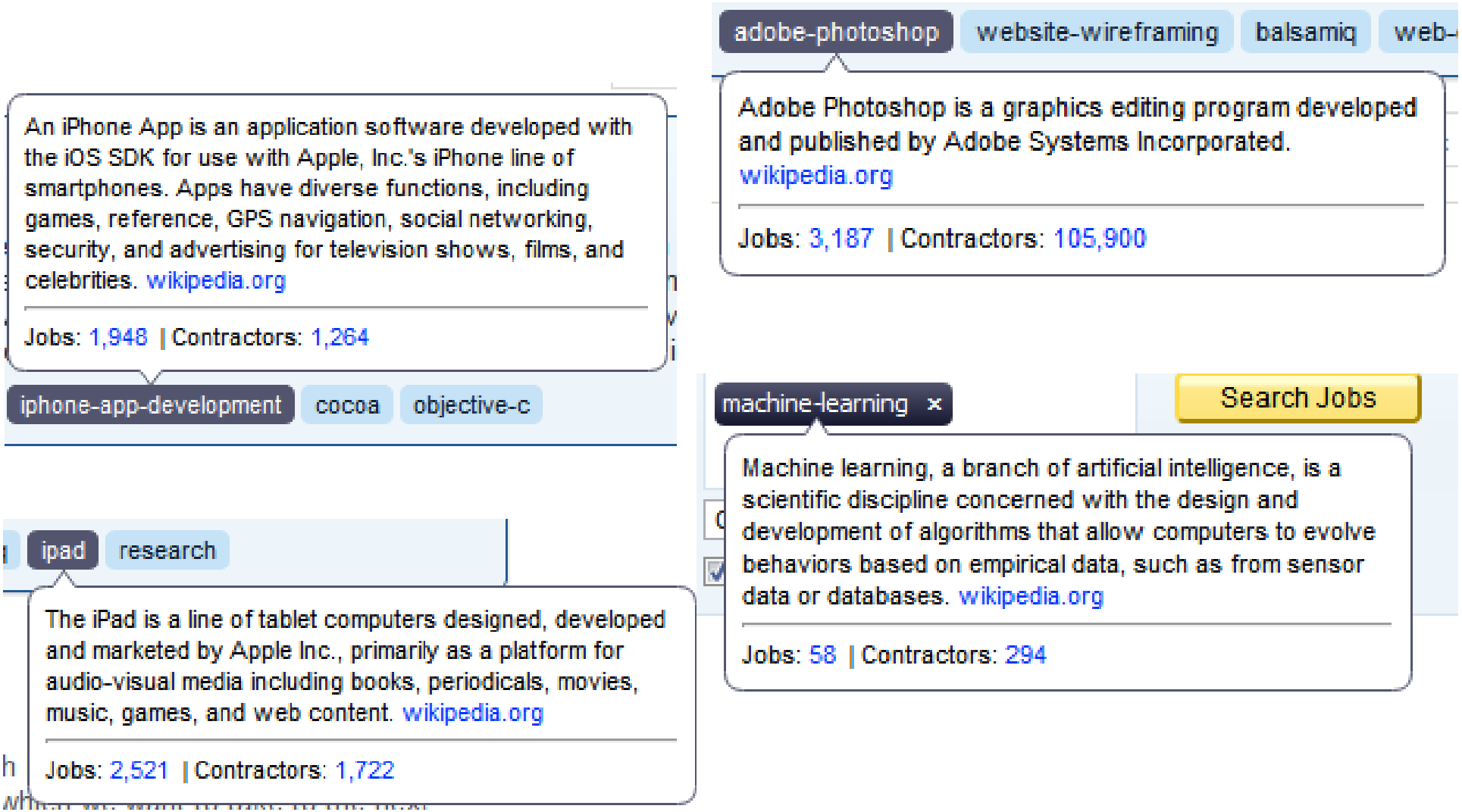
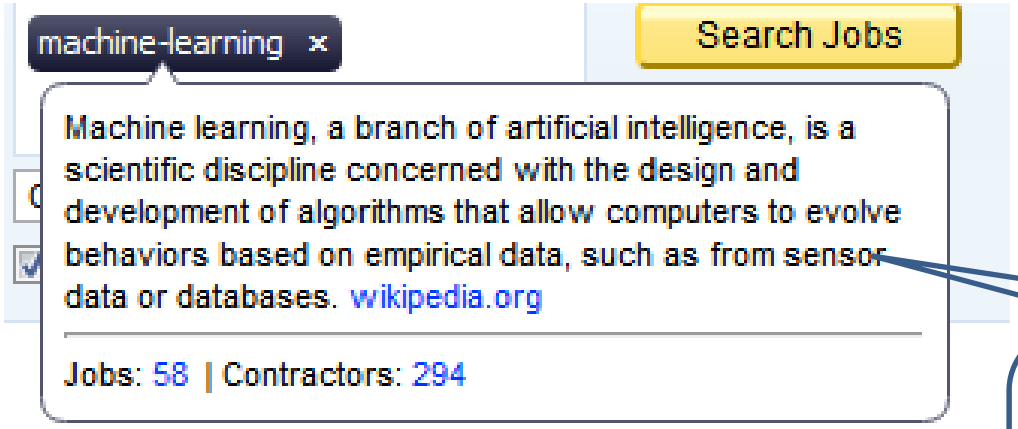
Utility of (Future) Skills

U = F(NewJobs, NewOfferedRate, NewAskingRate) x NewPr(hired)

What is the ***utility*** of each skill?

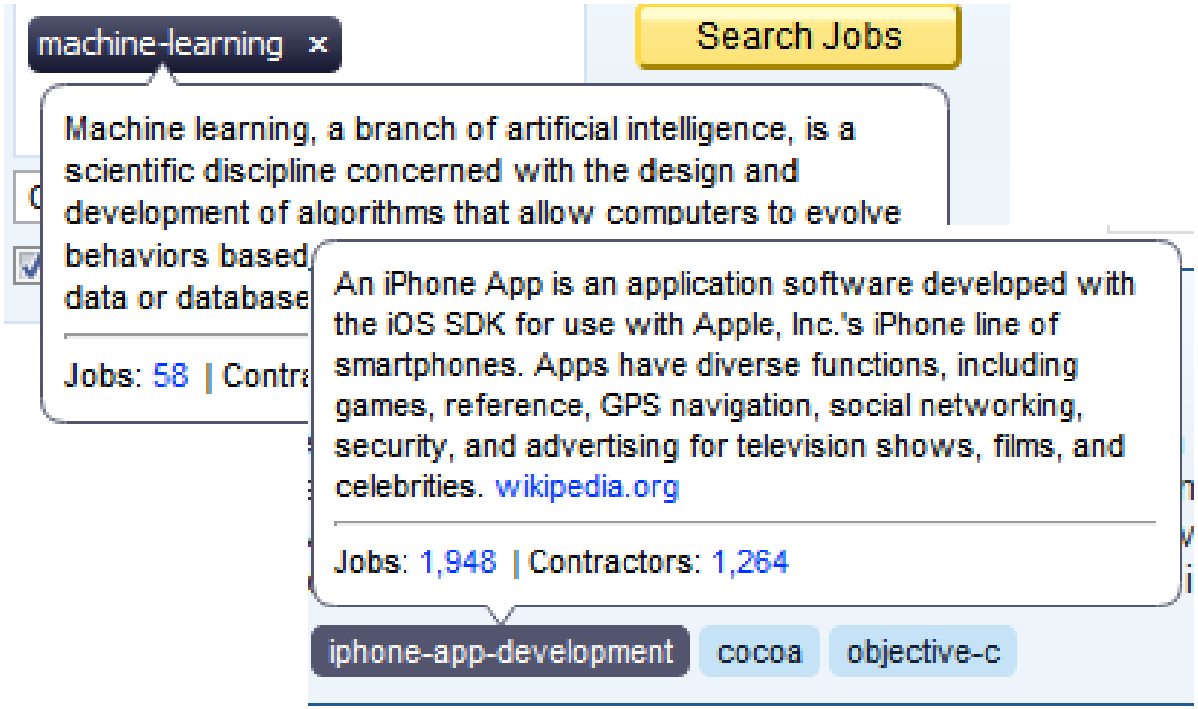


What is the ***utility*** of each skill?

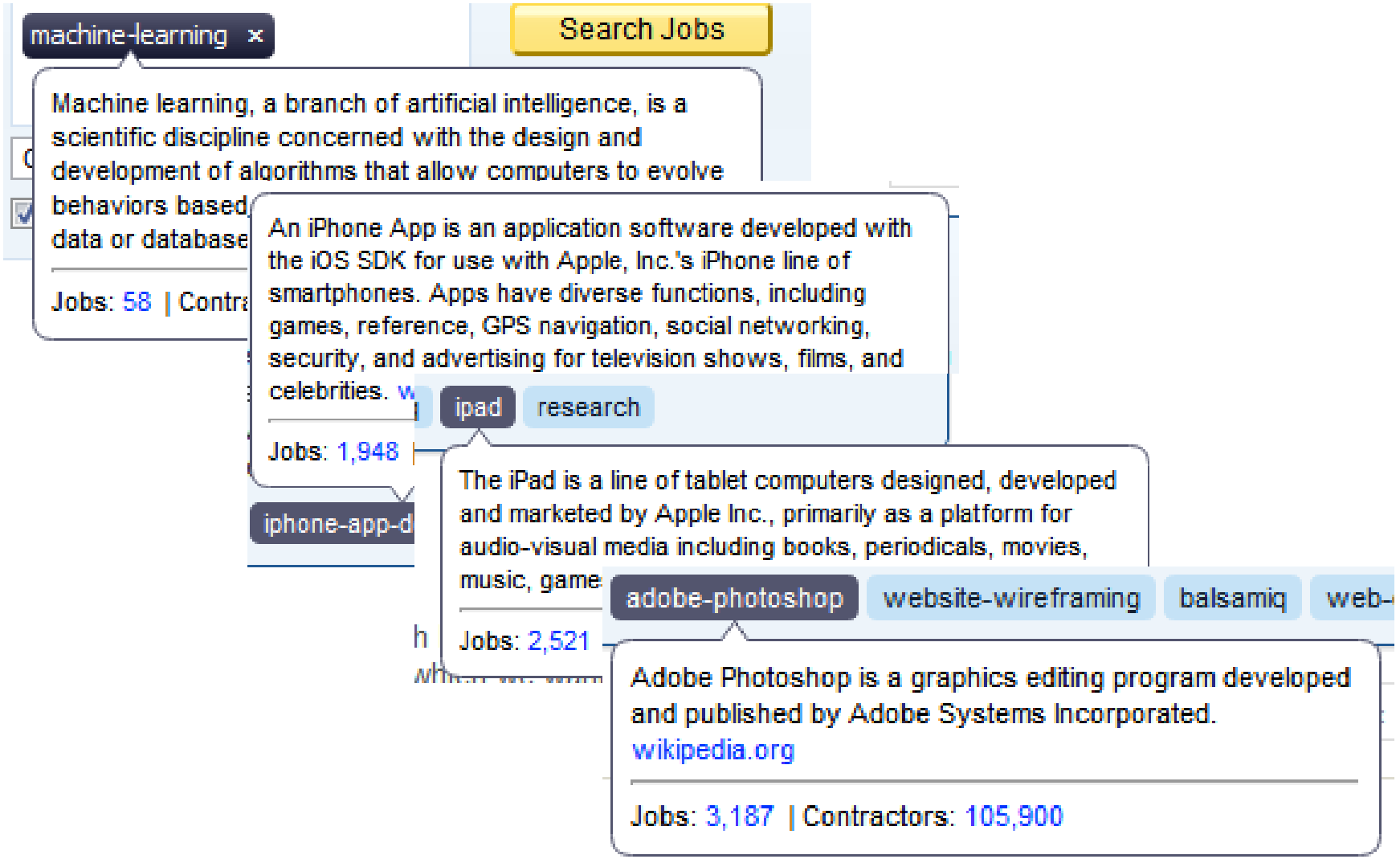


Hey, do you have a (good) machine learning person that I can hire through oDesk? Cost is not a problem!

What is the ***utility*** of each skill?



What is the ***utility*** of each skill?



OK, problem solved! (not)

coursera COURSES A

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Andrew Ng, Associate Professor

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Workload: 5-7 hours/week

Statistics, Data Analysis, and Scientific Computing

Computer Science: Artificial Intelligence, Robotics, Vision

"**Market for Intellect**": Model

- Assume market is "mostly efficient"
  - Some skill channels do have higher utility than others
  - Utility is "similar" across skill channels, adjusted for crossing costs
  - But jumping across channels has an opportunity cost
- Workers self-select skills to learn:
  - If worker does not have skill, this is not random but a choice ("endogenous choice"): The "Return on investment" is negative/small
- Estimate distribution of utilities across workers
- Estimate distribution of "time to learn"

What is the ***opportunity cost***?

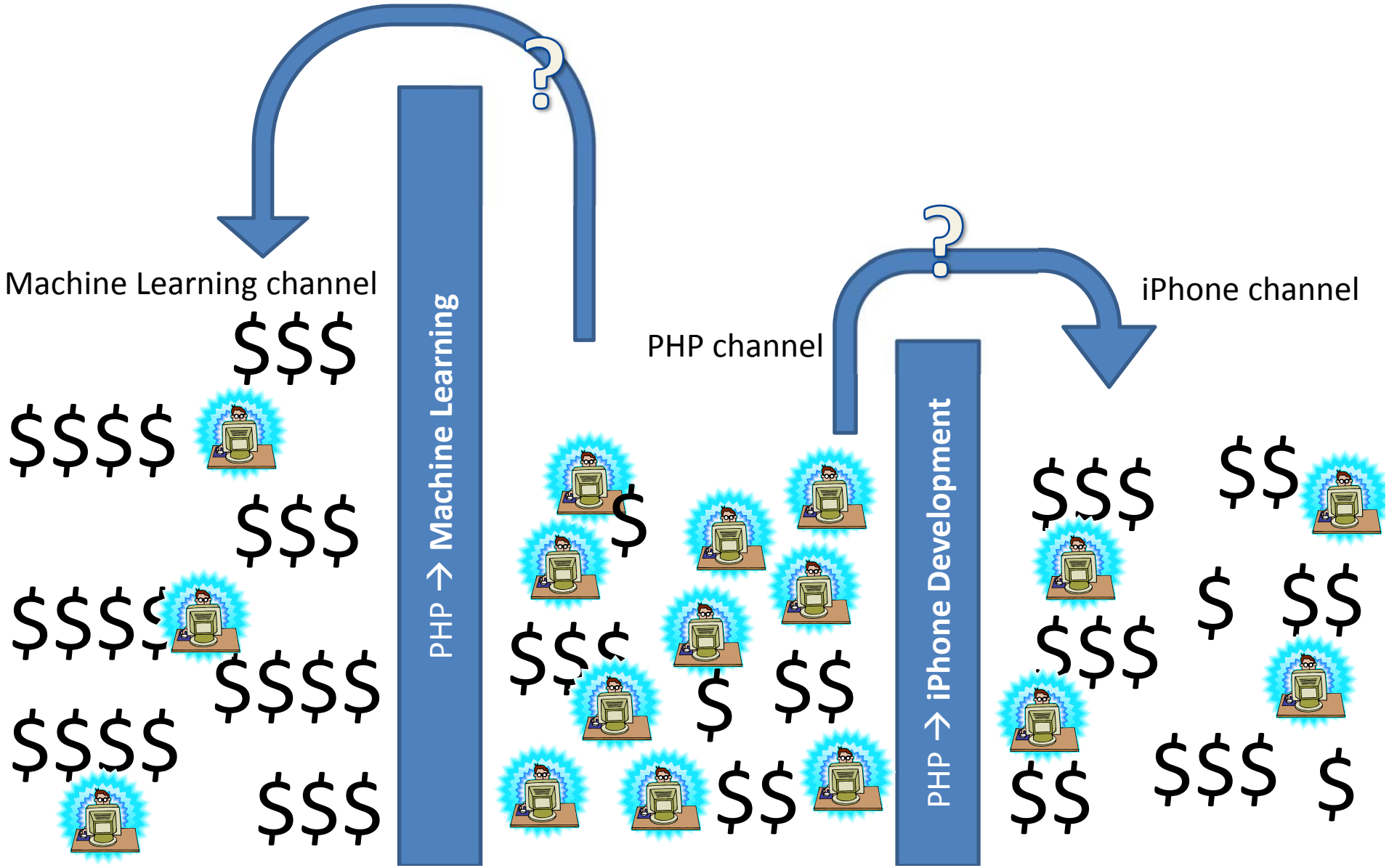
Cost(Skill) = “Utility of Current Skills” x “Time to Learn”

U(Current_Skills) = F(Jobs, OfferedRate, AskingRate) x Pr(hired)

U(Future Skills) = F(Jobs’, OfferedRate’, AskingRate’) x Pr’(hired)

Differences in utility between old and new skills show how long it takes to learn a skill

Barriers to entry:
Utility vs. Opportunity Cost



What is the net ***utility*** of each skill?

Thanks!

Questions?