

# data processing with mechanical turk

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# Mechanical Turk

## Make Money by working on HITs

HITs - *Human Intelligence Tasks* - are individual tasks that you work on. [Find HITs now.](#)

**As a Mechanical Turk Worker you:**

- Can work from home
- Choose your own work hours
- Get paid for doing good work



## Get Results from Mechanical Turk Workers

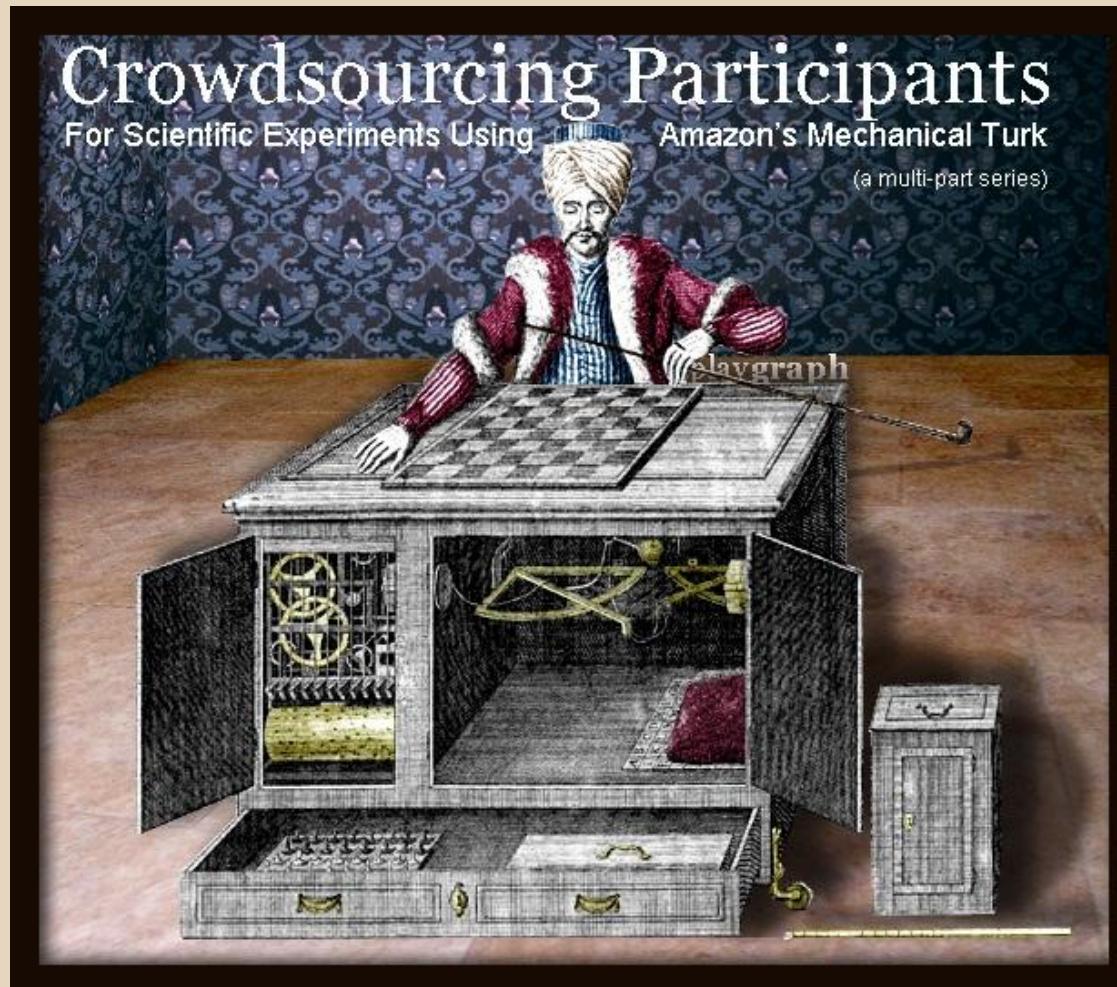
Ask workers to complete HITs - *Human Intelligence Tasks* - and get results using Mechanical Turk. [Get started.](#)

**As a Mechanical Turk Requester you:**

- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results



# "The Turk"



## Crowdsourcing Participants

For Scientific Experiments Using

Amazon's Mechanical Turk

(a multi-part series)

# Lets focus on the crowdsourcing...

Relatively cheap means of getting random samples of input for small, tedious tasks

"Crowdsourced labor can cost companies less than half as much as typical outsourcing"  
-- Panagiotis G. Ipeirotis, an associate professor at NYU's Stern School of Business

"Nothing is a waste of time if you use the experience wisely."

~Auguste Rodin

NEVER HAVE I FELT SO  
CLOSE TO ANOTHER SOUL  
AND YET SO HELPLESSLY ALONE  
AS WHEN I GOOGLE AN ERROR  
AND THERE'S ONE RESULT  
A THREAD BY SOMEONE  
WITH THE SAME PROBLEM  
AND NO ANSWER  
LAST POSTED TO IN 2003

WHO WERE YOU,  
DENVERCODER9?  
WHAT DID YOU SEE?!



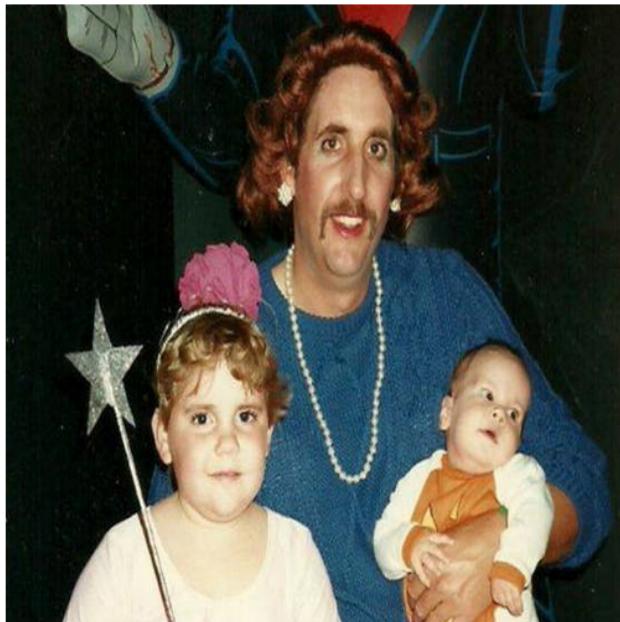
# The business challenge....



# The solution....

**Determine if the photo is a person or a pet.**

Determine if the photo is a person or a pet.



**Look at images and determine if the photo is of a person or a pet.**

- Person
- Animal
- WTF

**Determine if the photo is a person or a pet.**

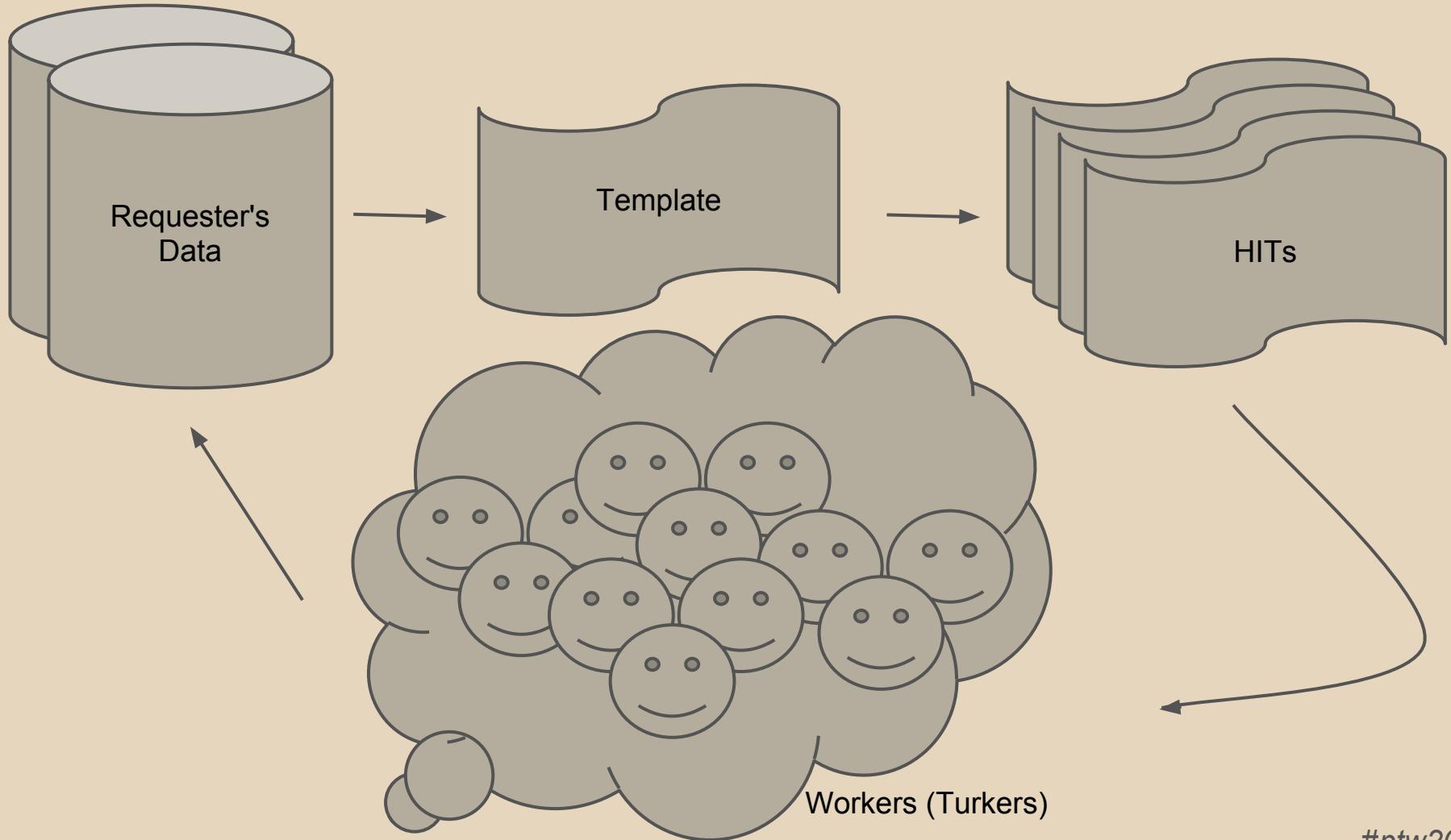
Determine if the photo is a person or a pet.



**Look at images and determine if the photo is of a person or a pet.**

- Person
- Animal
- WTF

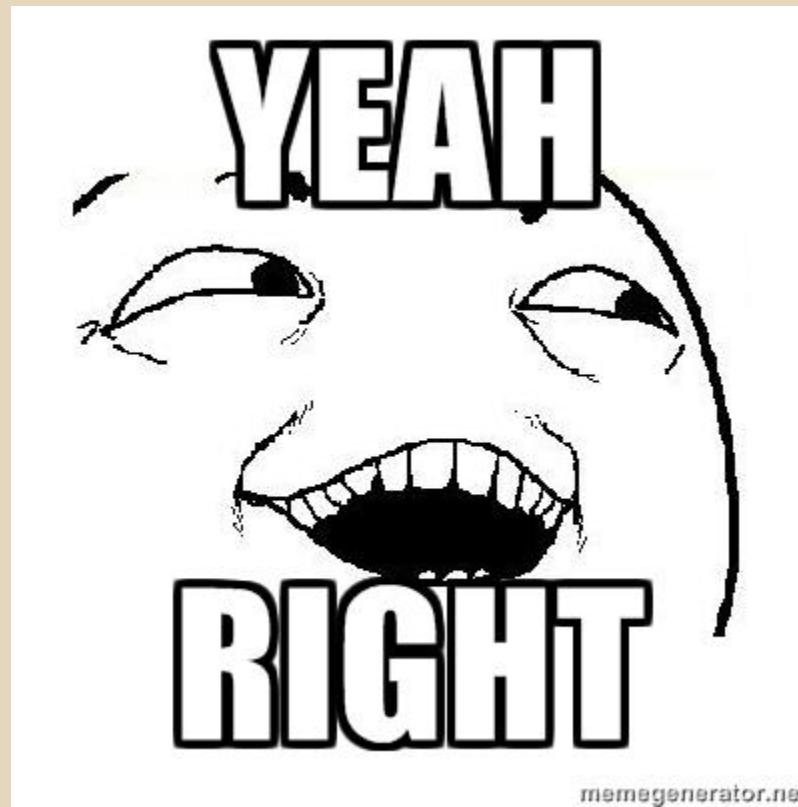
# Let start with the basics



# Use cases

- Classification
- Transcription
- Content Generation
- Surveys

# Do people actually use this?



memegenerator.net

# AOL

**AOL video** beta  
If it's out there, you'll find it here™

search video

Search Videos Across The Web

Yep. We've got that.  
You'll find it. Fast.  
Get It. Now.

AOL shopping

**Top Categories**

- Video Main
- VOD Channels A-Z
- Celebrities
- Comedy
- Kids
- Learning & Adventure
- Movies
- Music
- News
- Special Interests
- Sports
- Television

**Community Videos**

- View Community Videos
- Upload Your Own Video

**My Video**

- My Account
- Redeem a Coupon
- Hi-Q & Purchased Video
- Playlist
- Sign in for Playlist

**Support**

- Help

**What's New 08.6.06**

**'Chappelle' > Buy for \$1.99**  
Relive All the Hilarity of Season One

**CHAPPELLE'S SHOW**

**Sessions**  
Rihanna Sultry Singer Performs Hit 'Unfaithful' Watch Live Set

**Uncut Video**  
Purr-fect Folly More Irresistible Crazy Felines Caught on Tape See Them Play

**InTV**  
"Growing Pains" Relive Seaver Family Fun in Full Episodes Watch for Free

**User Video**  
Shoot & Share Upload Your Clips for the World to See Click Here

**Upload**

**All-New AOL Video**

**New AOL video**

**Video On Demand Channels** See All

<b>IMZ.com</b>	Rider Gets Stuck more... Was Not Drunk	US Open of Surfing more... Cast Discusses Film
<b>LOL TV</b>	Perfect Strangers : Crime Busters	Welcome Back, Ko... Sweatwork!
<b>moviefone</b>	'Rocky Balboa' Trailer	Shyamalan Interview : Unscripted
<b>MTV</b>	Laguna Beach : '18 Candles'	Laguna Beach : 'Graduation Day'
<b>nick</b>	Wonder Showzen : Birth	Andy Milonakis : Season 1, Ep. 3'
<b>Dora The Explorer</b>	Dora Saves the Prince	Avatar : Imprisoned

**HotList**

**1** Reporter Gets Slapped Winchester takes question kindly View Now

**2** A Wild Celebration Kid rejoices after winning

**3** Spidey Visits X-Men Gof has actor in stitches

• Music: Nick Lachey, 'I Can't Hate'  
• News: Freak Car Crash

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# Twitter



 **Big Bird**  
@BIGBIRD [Follow](#)

WTF Mitt Romney... :(

[Reply](#) [Retweet](#) [Favorite](#)

34,503 RETWEETS	5,603 FAVORITES
-----------------	-----------------



6:39 PM - 3 Oct 12 · Embed this Tweet

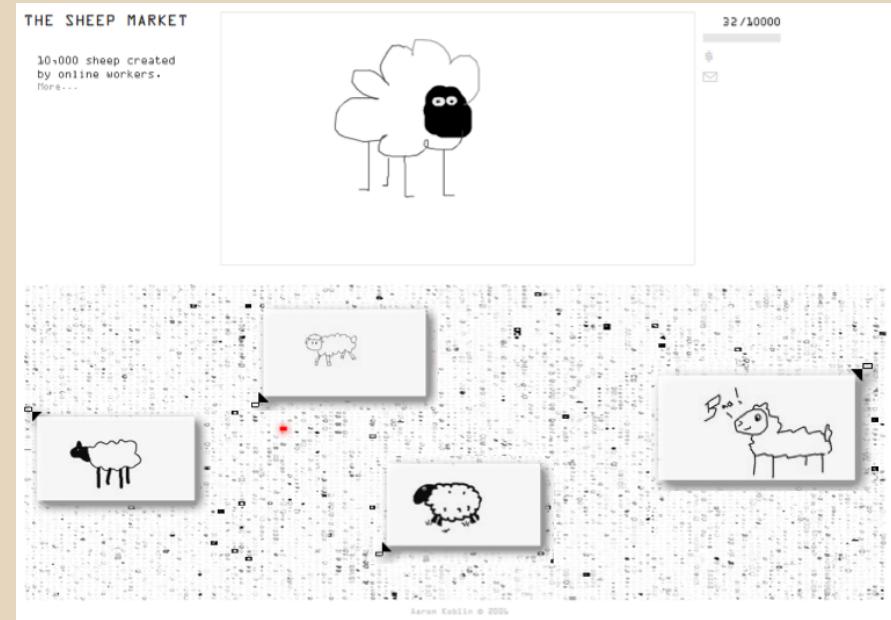
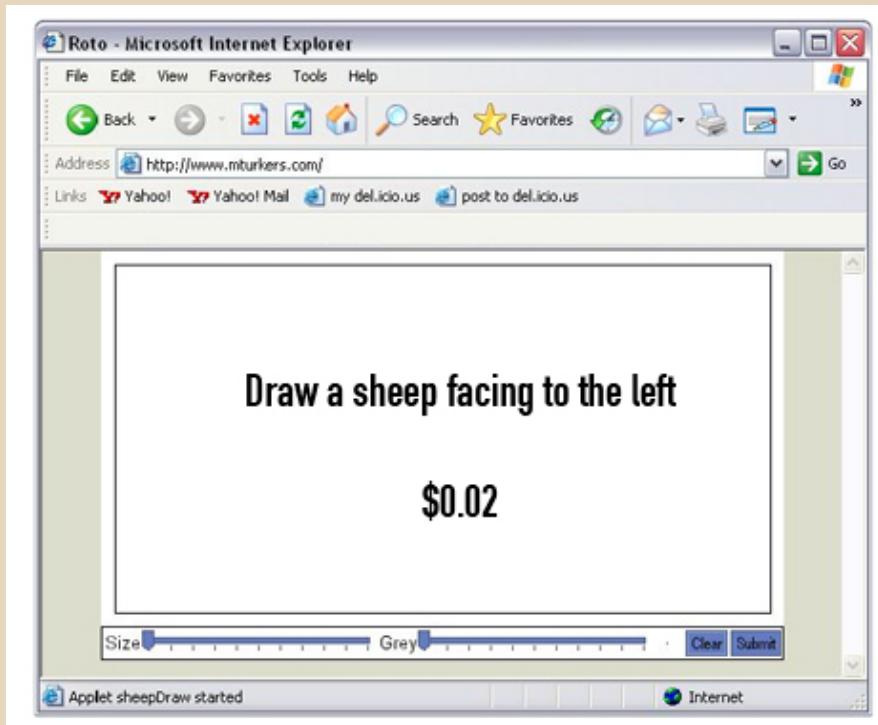
WeKnowMemes

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# CardMunch @LinkedIn

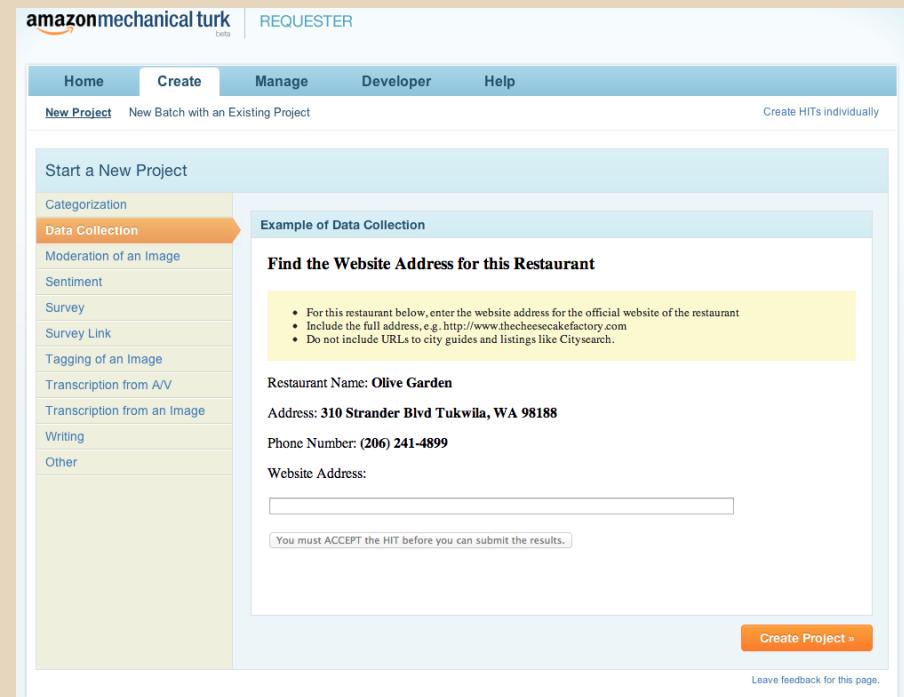


# The Sheep Market



# Development Tools

- Requester user interface
- Amazon offers four official APIs
  - Ruby, .NET, Perl, and Java
- AWS API
- Boto mturk
  - Python
- Houdini, Clockwork Raven, Crowdflower, QuikTurKit



# Create a HIT

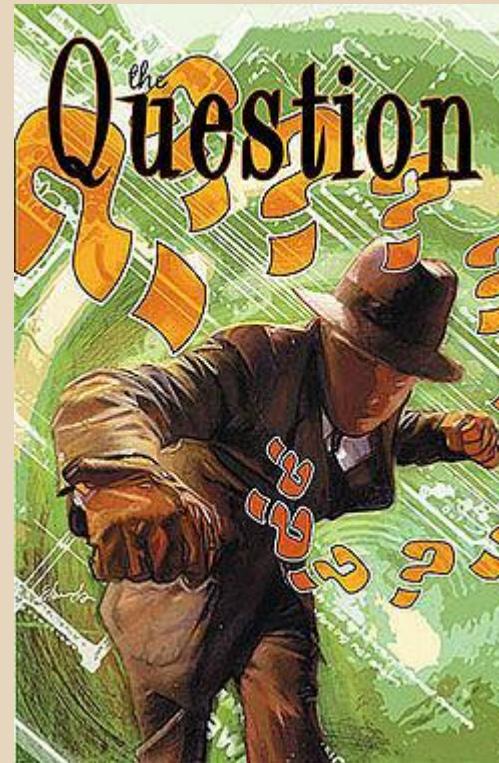
- A title
- A description
- Keywords, used to help Workers find the HITs with a search
- The amount of the reward
- An amount of time in which the Worker must complete the HIT
- An amount of time after which the HIT will no longer be available to Workers
- The number of Workers needed to submit results for the HIT before the HIT is considered complete
- Qualification requirements
- All of the information required to answer the question

# Process Results

- Assignment id
- Worker id
- HIT id
- Assignment status
- Auto approval time
- Accept time
- Submit time
- Approval time
- Rejection time
- Deadline
- Answer
- Requester feedback

# What was the question?

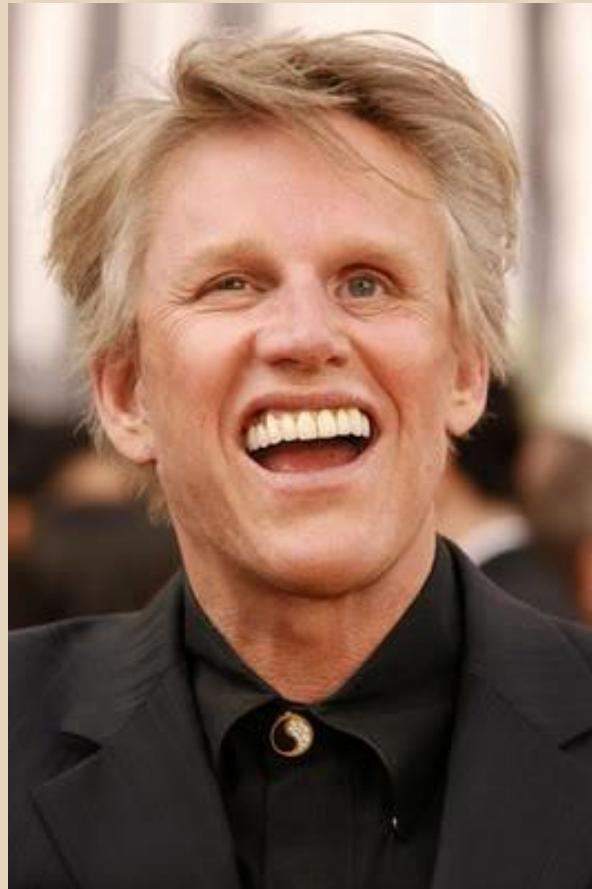
- Question forms
- External questions
- HTML questions



# Formatting HITs

- Compact
- Coherent
- Cost-effective

# Bad Actors



"Unfortunately, since manually verifying the quality of the submitted results is hard, malicious workers often take advantage of the verification difficulty and submit answers of low quality." [1]

# Quality Control

- Manually spot check
- Qualifications
- Multiple agreement
- Gold HITs
- Calculate worker error



# Quality Control: Manually Check

Look through the results of some workers and manually reject/ban those which look bad



# Quality Control: Multiple Agreement

1. Submit HITs to multiple turks (3-10)
2. Reject/throw out all HITs below some agreement threshold



# Quality Control: Qualifications

- Pay extra for "superior" turks
- Build your own custom qualification



"Thought Masters was just bad for non-blessed workers? It's even worse for requesters [1]"

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# Quality Control: Gold HITs

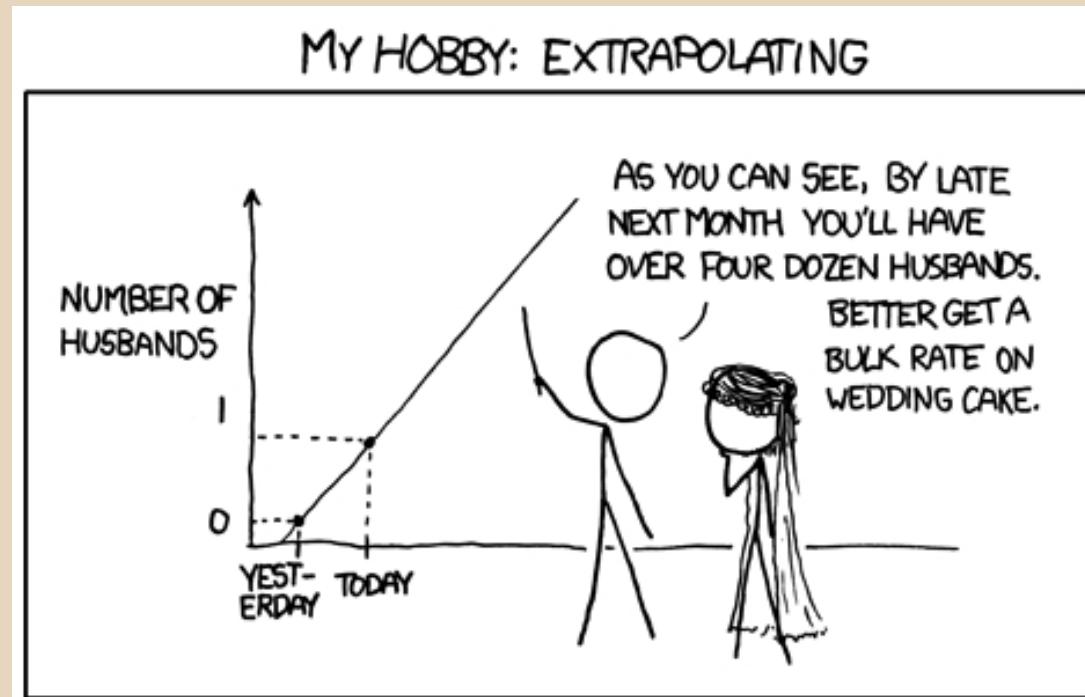
1. Give turks HITs which we know the correct answer to
2. Reject/Ban turks with high error rates

This technique is used by [CrowdFlower](#)



# Quality Control: Calculate Error

Calculate each worker's error rate based solely on their agreement with other workers. Use an expectation-maximization algorithm as described by Dawid and Skene.



Lots of math, consider using 3rd party service like [Project Troia](#)

# Auto-approval



*"Quick approval is important, too. Watching that money pile up is a serious motivator; I'll sometimes choose a lower-paying task that approves in close to real time over a higher-paying one that won't pay out for several days."*

-worker[[1](#)]

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# Turkopticon

"Turkopticon lets you REPORT and AVOID shady employers"

The screenshot shows the Amazon Mechanical Turk dashboard. At the top, there are tabs for 'Your Account', 'HITs', and 'Qualifications'. A red arrow points to a callout bubble on the left side of the page.

**Callout Bubble Content:**

- COMPLETE AN EASY DATING PROFILE!**
- Requester:** Margaret Gonzalez
- HIT Expiration Date:** Aug 22, 2012 (6 days 22 h)
- communicativity:** 1 / 5
- generosity :** 1 / 5
- fairness :** 1 / 5
- promptness :** 1 / 5
- Allotted:** 35 minutes

**Below the callout:**

- SET-UP A FREE**
- Requester:** [Redacted]
- What do these scores mean?**
- Scores based on 1 reviews**
- Report your experience with this requester »**

**Bottom of the page:**

- Simple And Fun Hit For TV Show Watchers**
- Requester:** Stacey Walsh
- HIT Expiration Date:** Aug 22, 2012 (6 days 22 h)

# Turkernation

"If you want to make a living on Amazon Mechanical Turk, this is the forum for you"

The screenshot shows the homepage of the Turkernation forum. At the top, there's a navigation bar with links for Forum, Latest Posts, Turk Alert, Twitter, Facebook, and Shop on Amazon. Below the navigation is a search bar and links for User Name, Log in, Help, Register, and Remember Me?.

The main content area has a yellow header bar with links for FAQ, Forum Actions, and Advanced Search. Below this, a breadcrumb trail shows the user is in Forum > General Turking > Requester Introductions.

A note at the top of the page reads: "Note: clicking on the above banners and making ANY purchase returns a commission to Turker Nation. If you can't see the ad, please click on Shop on Amazon above instead."

A message for new visitors: "If this is your first visit, be sure to check out the [FAQ](#). You must [register](#) before you can post or view the content of private forums. To start viewing messages, select the forum that you want to visit from the selection below."

A "Post New Thread" button is visible. The "Forum: Requester Introductions" section is described as a place for requesters to introduce themselves to the Turker community. It notes that announcements of new HITs should be posted in Everyone Else, and if you don't have access to EE, PM [Spamgirl](#) and she'll set you up. There are links for Forum Tools and Search Forum.

The main thread list is titled "Title / Thread Starter" and includes columns for Replies / Views and Last Post By. The first thread is an announcement: "Announcement: Is your password here the same as mTurk? UPDATE PLEASE READ!" by [spamgirl \(The Big Boss\)](#), posted on 09-26-2011 with 4,120 views. Other threads include "Global: To do or not to do the HIT which asks for your TN username" by [spamgirl](#), "Global: Shop on Amazon.com? How you can help support Turker Nation" by [spamgirl](#), "Global: Please read the rules!" by [librarian50](#), and "Global: \*\*\* IMPORTANT READ: HITs You Should NOT Do! \*\*\*" by [librarian50](#).

The "Normal Threads" section shows a message: "There are no posts in this forum."

At the bottom, there's a "Post New Thread" button and "Thread Display Options" with dropdown menus for sorting threads by Beginning or Last Post Time, and ordering them Ascending or Descending. There are also "Quick Navigation" and "Show Threads" buttons.

# Do's and Don'ts



[universalweather.com/blog](http://universalweather.com/blog)

# What exactly do I do with this?



# A demo in python



# Requirements

```
1 from collections import defaultdict
2
3 from boto.mturk.connection import MTurkConnection
4 from boto.mturk.qualification import Requirement, Qualifications
5 from boto.mturk.question import (
6     AnswerSpecification,
7     FormattedContent,
8     FreeTextAnswer,
9     Overview,
10    Question,
11    QuestionContent,
12    QuestionForm,
13    SelectionAnswer,
14 )
15
```

# Data Details

```
28
29 # __Set data descriptions__
30
31 ONE_HOUR = 3600 # seconds
32 ONE_DAY = ONE_HOUR * 24
33 ONE_WEEK = ONE_HOUR * 24 * 7
34
35 urls = [
36     'http://media.egotvonline.com/wp-content/uploads/2011/10/costume-dogs-in-fast-food-costumes.jpg?41ed4f',
37     'http://runt-of-the-web.com/wordpress/wp-content/uploads/2012/10/awkward-halloween-dad.jpg',
38 ]
39 selections = (('Person', 0), ('Animal', 1), ('WTF', 2))
40 description = 'Look at images and determine if the photo is of a person or a pet.'
41 title = 'Determine if the photo is a person or a pet.'
42 keywords = ['pets', 'people', 'photos', 'classification']
43
44
```

# Question template

```
45 # __Create a Question using a Question Form__
46 def add_image(url, overview, _id, width=20, height=20):
47     """Add an image to :param overview:."""
48     overview.append_field('Text', title)
49     overview.append(FormattedContent(
50         '</img>'.format(url, _id)))
51     return overview
52
53
54 def make_multiple_choice_question(url, selections, _id=''):
55     """Create a multiple choice question to classify :param urls:."""
56     content = QuestionContent()
57     content = add_image(url, content, _id)
58     content.append_field(
59         'Title', description)
60     answers = SelectionAnswer(
61         max=1,
62         min=1,
63         other=False,
64         selections=selections,
65         style='radiobutton',
66         type='text',
67     )
68     question = Question(
69         answer_spec=AnswerSpecification(answers),
70         content=content,
71         identifier='{0}'.format(url),
72         is_required=True,
73     )
74     return question
75
76
77 def make_question(url, selections):
78     """Build a formatted question to be posted on mechanical turk.
79
80     :param urls: Images to be displayed in mc question.
81     :param selections: Answer selections.
82
83     """
84     mc_overview = Overview()
85     mc_overview.append_field('Title', title)
86
87     question_form = QuestionForm()
88     question_form.append(mc_overview)
89     question_form.append(make_multiple_choice_question(url, selections))
90     return question_form
91
```

# Build a custom qualification

```
92
93 # __Create Custom Qualification ID__
94
95 # __You'll need test data for your qualification test__
96
97 def create_answer_xml(identifier, selection, score):
98     xml_string = (
99         '<Question>'
100        '<QuestionIdentifier>{0}</QuestionIdentifier>'
101        '<AnswerOption>'
102        '<SelectionIdentifier>{1}</SelectionIdentifier>'
103        '<AnswerScore>{2}</AnswerScore>'
104        '</AnswerOption>'
105        '</Question>'
106    ).format(identifier, selection, score)
107    return xml_string
108
109 def create_custom_qual_id(test_question, answer_key):
110     quals = mtc.create_qualification_type(
111         answer_key=answer_key,
112         auto_granted=False,
113         description=description,
114         keywords=keywords,
115         name='My Unique Name',
116         retry_delay=None,
117         status='Active',
118         test=test_question,
119         test_duration=3600,
120     )
121     qual = quals.pop()
122     return qual.QualificationTypeId
123
124 def make_qual_type(
125     comparator="Exists",
126     integer_value=None,
127     qual_type=custom_qualification_id,
128     required_to_preview=False,
129 ):
130     """Creates a qualification requirement for workers to accept HITs."""
131     return Requirement(
132         comparator=comparator,
133         integer_value=integer_value,
134         qualification_type_id=qual_type,
135         required_to_preview=required_to_preview,
136     )
137
```

# Post HITs....

```
137 test_url = 'http://julien.danjou.info/media/images/lolcat-testing.jpg'
138 test_answer = dict(selections)['Animal']
139 test_question = make_question(test_url, selections)
140
141 answer_key = "<AnswerKey xmlns='{0}'>".format(
142     'http://mechanicalturk.amazonaws.com/AWSMechanicalTurkDataSchemas/2005-10-01/AnswerKey.xsd')
143 answer_key += create_answer_xml(test_url, test_answer, 1)
144 answer_key += '</AnswerKey>'
145
146 custom_id = create_custom_qual_id(test_question, answer_key)
147 custom_qual_type = make_qual_type(
148     comparator="GreaterThanOrEqualTo",
149     integer_value=1,
150     qual_type=custom_qualification_id,
151     required_to_preview=False,
152 )
153 qualifications = Qualifications()
154 qualifications.add(custom_qual_type)
155
156 hits = defaultdict(lambda : defaultdict())
157 for url in urls:
158     hit = mtc.create_hit(
159         annotation=None,
160         approval_delay=1,
161         description=description,
162         duration=ONE_HOUR,
163         keywords=keywords,
164         lifetime=ONE_WEEK,
165         max_assignments=1,
166         qualifications=qualifications,
167         questions=make_question(url, selections),
168         response_groups=[
169             'HITAssignmentSummary', 'HITDetail', 'HITQuestion', 'Minimal'],
170         reward='0.02',
171         title=title,
172     )
173     hits[hit[0].HITId] = {'url': url}
174
175
```

# Success.

You are using the Mechanical Turk Developer Sandbox. This site is for test and development only. [Learn more »](#)

**amazon mechanical turk** Artificial Artificial Intelligence      Etrik Patricella | [Account Settings](#)

Your Account    HITS    Qualifications    409,816 HITs available now

All HITs | HITs Available To You | HITs Assigned To You

Find **HITs** containing  that pay at least \$ **0.00**  for which you are qualified  require Master Qualification

**HITs containing 'kelly'**  
1-1 of 1 Results

Sort by: **HITs Available (most first)**  Show all details | Hide all details

Determine if the photo is a person or a pet. [View a HIT in this group](#)

Requester: [Kelly](#) HIT Expiration Date: Apr 29, 2013 (6 days 23 hours) Reward: \$0.02  
Time Allotted: 60 minutes HITs Available: 2

Description: Look at images and determine if the photo is of a person or a pet.

Keywords: [pets](#), [people](#), [photos](#), [classification](#)

Qualifications Required: [Your Value](#)

My Unique Name is not less than 1    1    You meet this qualification requirement [Contact the Requester of this HIT](#)

[FAQ](#) | [Contact Us](#) | [Careers at Amazon](#) | [Developers](#) | [Press](#) | [Policies](#) | [Blog](#)  
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# Let the work begin.

**Timer:** 00:00:13 of 60 minutes [Finished with this HIT?](#) [Let someone else do it?](#)

**Total Earned:** \$3.34 **Total HITs Submitted:** 142

Automatically accept the next HIT

**Determine if the photo is a person or a pet.**

Requester: Kelly Reward: \$0.02 per HIT HITs Available: 1 Duration: 60 minutes

**Qualifications Required:** My Unique Name is not less than 1

**Determine if the photo is a person or a pet.**

Determine if the photo is a person or a pet.



The image shows four dogs dressed up as food items. From left to right: 1. A dog dressed as a chef, holding a donut. 2. A dog dressed as a large serving of french fries. 3. A dog dressed as a smiley face burger with a happy face on it. 4. A dog dressed as a large hamburger. They are standing in front of a house with a window that says "TRICK OR TREAT".

**Look at images and determine if the photo is of a person or a pet.**

Person  
 Animal  
 WTF

# To get results...

```
180
181 # Turkers will preview, accept and respond to HITS.
182 # Retrieve and review thier response:
183
184 def get_reviewable_hits(page_num=1, page_size=10):
185     """Return all hits on the :param page_num:, with :param page_size:."""
186     return mtc.get_reviewable_hits(
187         page_number=page_num,
188         page_size=page_size,
189         sort_by='Enumeration'
190     )
191
192 def parse_assignments(assignments):
193     """Extract each answer from ::param assignments::."""
194     for assignment in assignments:
195         classification = _parse_answers(assignment)
196     return classification
197
198 def _parse_answers(assignment):
199     """Return a list of dicts, each containing an answer's details."""
200     classification = {}
201     answer = assignment.answers[0][0]
202     if not answer.fields[0]:
203         return
204     ind_id = int(answer.fields[0])
205     classification.update({'selection': selections[ind_id][0]})
206     classification.update({'selection_id': ind_id})
207     classification.update({'worker_id': assignment.WorkerId})
208     return classification
209
210 reviewable_hits = get_reviewable_hits()
211 for hit in reviewable_hits:
212     assignments = mtc.get_assignments(hit.HITId)
213     responses = parse_assignments(assignments)
214     hits[hit.HITId].update(responses)
~
```

# AWeber



We're hiring.

....and we have slides.



