Experiments with TurKit

Crowdsourcing and Human Computation

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Website: crowdsourcing-class.org

TurKit in action

edu.mit.csail.uid.turkit.gui.Main

code.js – TurKit 0.2.9

File Tools

real | Stop | Run | Run Repeatedly | stopped

input | properties

```
                    <td><input name="voteB" type="
submit" value="&gt;" style="width:30px;height:50px
"></input></td>
                    <td><pre style="width:500px;bo
rder:thin solid; white-space: pre-wrap; white-spac
e: -moz-pre-wrap; white-space: -o-pre-wrap;">___DI
FF_B___</pre></td></tr>
                </table>
            </div>).replace(/___DIFF_A___/g, diff.a).r
eplace(/___DIFF_B___/g, diff.b),
            // this is where we prohibit the person wh
o wrote this passage from voting on it (it is the
second parameter to createWebpageFromTemplate, whi
ch can also be an array of workerId's if we want t
o block multiple workers
            hit.assignments[0].workerId)

    // create a HIT on MTurk using this page
    var voteId = mturk.createHIT({
        title : "Vote on Text Improvement",
        desc : "Decide which two small paragraphs
is closer to a goal.",
        url : votePage,
        height : 800,
        reward : 0.1,
        assignments : 2
    })

    // we gave the HIT 2 assignments,
    // which will get 2 votes,
    // but if these votes disagree,
    // then we'll want a 3rd vote,
    // so we use the utility function "mturk.vote"
    // to handle this.
    var voteResults = mturk.vote(voteId, function
(answer) {return answer.voteA ? "old" : "new"})

    // decide what to do depending on how people v
oted
    if (voteResults.bestOption == "new") {
        text = newText
        mturk.approveAssignment(hit.assignments[0]
)
        print("\nvote = keep\n")
    } else {
        mturk.rejectAssignment(hit.assignments[0])
        print("\nvote = reject\n")
    }

    // clean up after ourselves...

    // first, let's delete the original HIT
    mturk.deleteHIT(hit)
    // NOTE: we don't need to delete the vote HIT,
    // this happens inside mturk.vote

    // we also created a couple pages on S3,
    // so delete them
    s3.deleteObject(webpage)
    s3.deleteObject(votePage)
}
```

utput

```
hit completed: 3SZYX62S5G0M1XZA950OM503XQS75I
------------------
A young boy is laying back with his head resting on his father's lap, both of them enjoying a sunny day on a bea
------------------
S3 object put at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/38d3sewxx4a2hjkdjqerq2gjuo9d2qld.html
created HIT: 33K3E8REWWVZ3UO3PGBPSONI198X85
        url: https://www.mturk.com/mturk/preview?groupId=307F0QTJA146X9OS8YORSV5B7948AT
hit completed: 33K3E8REWWVZ3UO3PGBPSONI198X85
extended HIT: 33K3E8REWWVZ3UO3PGBPSONI198X85
hit completed: 33K3E8REWWVZ3UO3PGBPSONI198X85
approved assignment 3DY4FPOOA1OF3UVXECL8J4HPV6LRVT
approved assignment 37Q970SNZE8BIXFCMN1O2QF5S4Y1S3
approved assignment 3PZDLQMM0TL2018C85B2S4LSY7QC21
disabled HIT: 33K3E8REWWVZ3UO3PGBPSONI198X85
approved assignment 33CKWXB73JKBODGI94M46PSW24K11I

vote = keep

disabled HIT: 3SZYX62S5G0M1XZA950OM503XQS75I
deleted S3 object at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/s2byujh43774neuaukjsmlg7pi3vwbms.html
deleted S3 object at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/38d3sewxx4a2hjkdjqerq2gjuo9d2qld.html
S3 object put at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/aezaoy8m4j5ybz88c36k1z0gs9yirnqu.html
created HIT: 3EFNPKWBMSO557CMANRMSTSWBGW03M
        url: https://www.mturk.com/mturk/preview?groupId=3OJEXC6LPT9DHFCD4AKWS3VGRIGRM7
hit completed: 3EFNPKWBMSO557CMANRMSTSWBGW03M
------------------
"This is some good stuff"
------------------
S3 object put at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/rpiyj50m198fb6dnvfpinchkc637hu4f.html
created HIT: 37SDSEDIN92RDT3AINQIXFJHWUV81Q
        url: https://www.mturk.com/mturk/preview?groupId=307F0QTJA146X9OS8YORSV5B7948AT
hit completed: 37SDSEDIN92RDT3AINQIXFJHWUV81Q
extended HIT: 37SDSEDIN92RDT3AINQIXFJHWUV81Q
hit completed: 37SDSEDIN92RDT3AINQIXFJHWUV81Q
approved assignment 37QW5D2ZRGMTTXZXL8A3H02D6A7S8H
approved assignment 3ZY8KE4ISJ3FRTGX1XW8EE7KZKOQVW
approved assignment 3A4TN5196KI6FRBURQE9F8RUNQCHCS
disabled HIT: 37SDSEDIN92RDT3AINQIXFJHWUV81Q
rejected assignment 3SEPORI8WNZ4DXEQDYOP9K5BJD8AZ9

vote = reject

disabled HIT: 3EFNPKWBMSO557CMANRMSTSWBGW03M
deleted S3 object at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/aezaoy8m4j5ybz88c36k1z0gs9yirnqu.html
deleted S3 object at: http://s3.amazonaws.com/AKIAIRJLLZLJNIFIQAMQ.TurKit/rpiyj50m198fb6dnvfpinchkc637hu4f.html
```

HITs / S3 | database

HITs:
none

S3 Objects:
none

Adorable baby with deep blue eyes, wearing light blue and white elephant pajamas and a floppy blue hat.

Baby Cool Looking and smooth skin,very bright eyes,attractive dressing wearing light blue and white elephant pajamas and a floppy blue hat.Overall impression very sweet and also funny.

Father and son on a sandy beach.

Super cute kid lounges on a sandy beach with his father.

A father caught in a moment of ease with his young son, enjoying the natural vibes of the water and sand on a sunny day at the beach.

A young boy is laying back with his head resting on his father's lap, both of them enjoying a sunny day on a beach.

This is some good stuff

What are the basic units of collecting work?

- Human computation is a new field
- Writing algorithms that involve people as function calls is relatively unexplored
- How can we characterize the types of work that we can do, or the processes that yield the best results?

Iterative v. Parallel Processing

- Basic distinction in the workflow
- Should crowd workers do tasks independently in parallel?
- Or should they work together in an iterative fashion and build off of each other's work?

Tradeoffs

- Iterative process shows each worker the results from previous workers
  - Must collect contributions serially
- Parallel processes asks each worker to solve a problem alone
  - no workers depend on the results of other workers, so can be parallelized

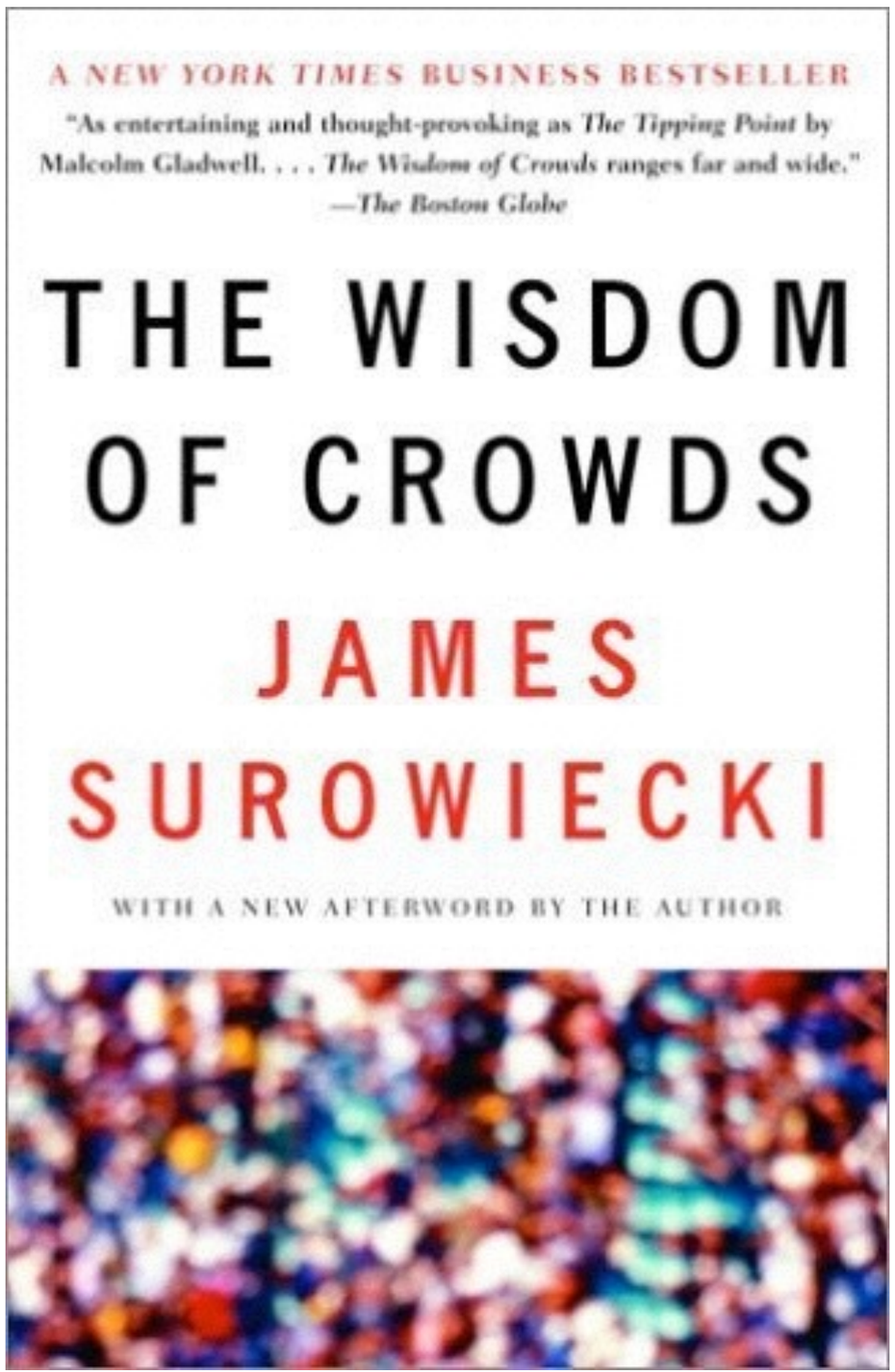
Threadless v. Wikipedia

- One person starts an article, and then other people iteratively improve it by looking at what people did before them and adding information, correcting grammar, creating a consistent style, etc.
- t-shirts are created in parallel. People submit ideas independently, and then others vote to determine the best ideas that will be printed.

Wisdom of Crowds

Requirements for a crowds to be wise

- Diversity of Opinion
- Independence
- De-centralization
- Aggregation



Wisdom of Crowds: Independence

Surowiecki argues that aggregating answers from a decentralized, disorganized group of people, all thinking independently yields more accurate answers than from individuals.

Individual errors need to be uniformly distributed, so individual judgments must be made independently.

Does this hold empirically on MTurk?

- Greg Little, Lydia Chilton, Max Goldman, and Rob Miller verify it through a set of experiments
- Exploring tradeoffs between iterative v. parallel processing in writing, brainstorming, and transcription.

Writing

Transcription

Brainstorming

- Our company sells headphones. There are many types and styles available. They are useful in different circumstances. Our site helps users assess their needs, and get the pair of headphones that is right for them.
- Please suggest 5 new company names for this company.

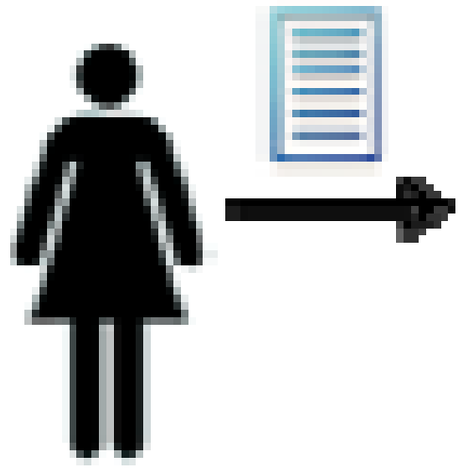
Higher level goals

- Establish models and design patterns for human computation processes
- Figure out how best to coordinate small contributions from many people to a achieve larger goal
- Focus is on *aggregation* dimension from taxonomy of human computation

Model

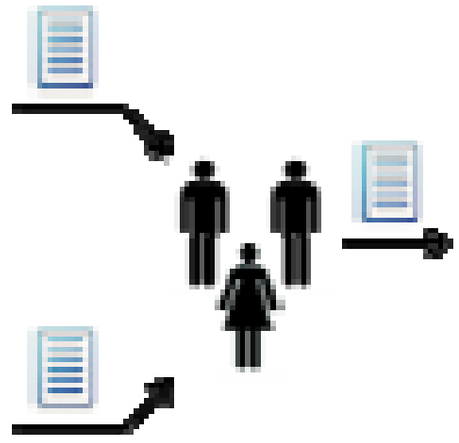
	dependently (iteratively)	independently (in parallel)
creation tasks		
decision tasks		

Creation tasks



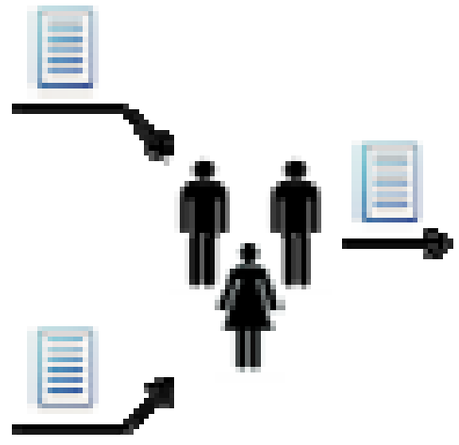
- Goal is to produce new high quality content
- Example creation tasks: writing, ideas, imagery, solutions
- Few constraints on worker inputs to the system
- Computer doesn't understand the input

Decision tasks



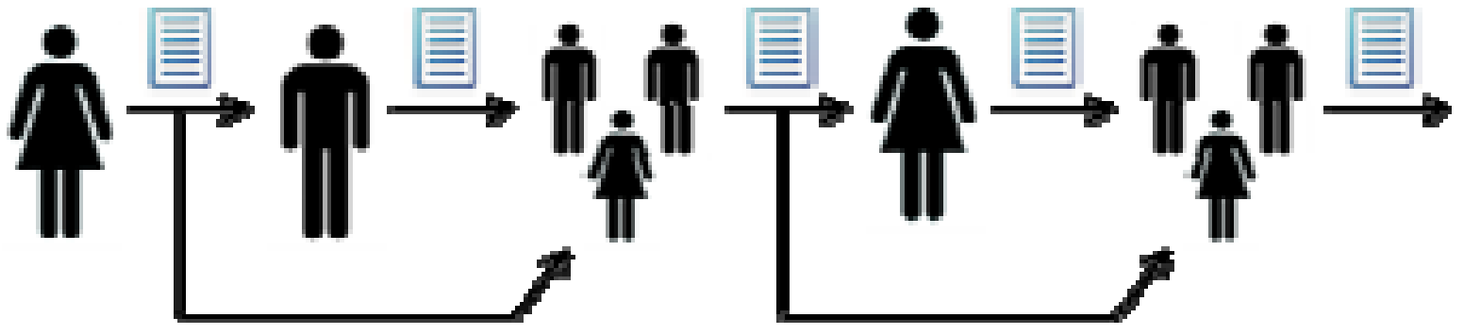
- Decision tasks solicit opinions about existing content
- Example: choose between two descriptions of the same image
- User input is constrained because the computer has to interpret the responses

Decision tasks



- Goal of decision tasks is to solicit *accurate* responses
- Solicit multiple responses and aggregate them
- Mechanisms:
  - **comparisons**: is image description A better than image description B?
  - **ratings**: Rate the quality of this description on a scale from 1-10

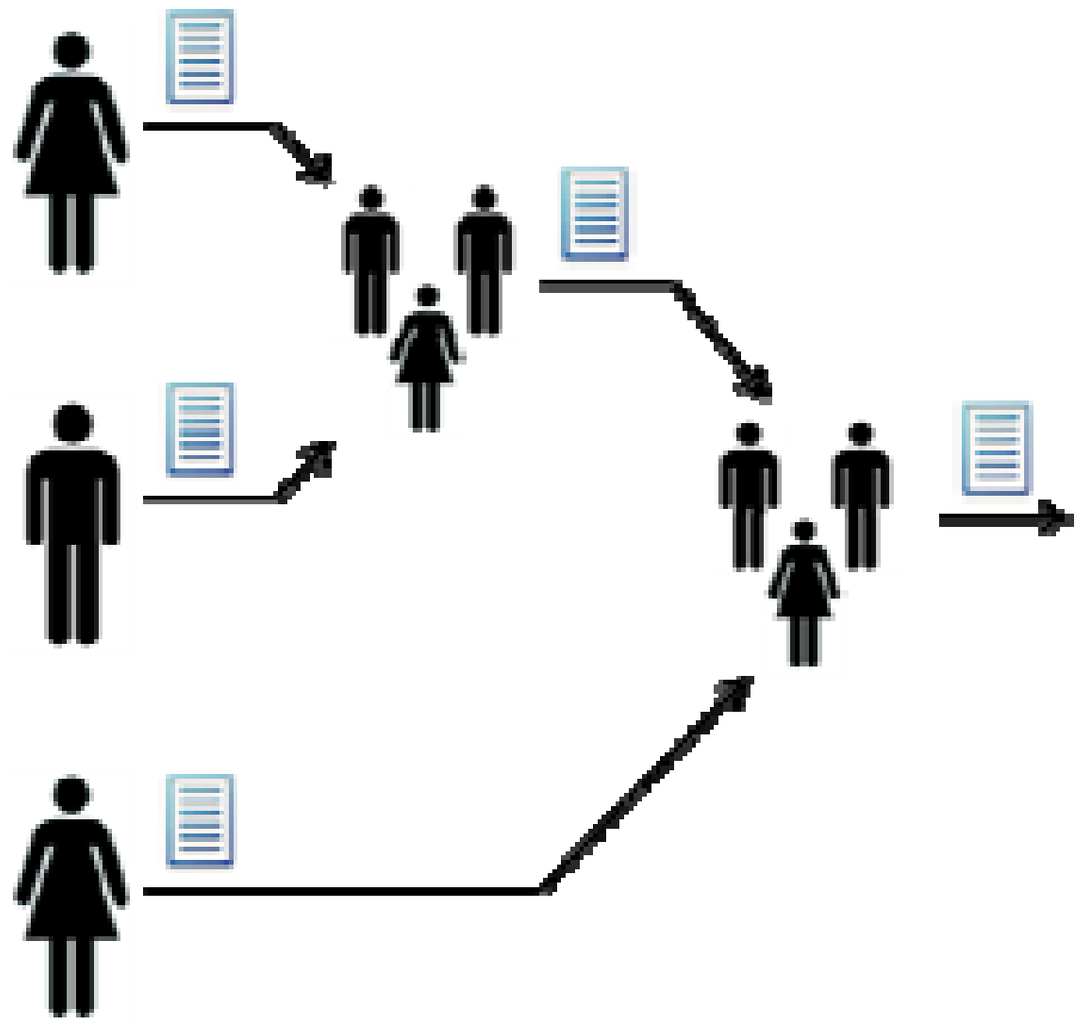
Pattern #1: Iterative Combination



- Workers are shown the content generated by previous workers
- Computer optionally tracks the best content, shows it or all previous content

Pattern #2: Parallel Creation

- Creation tasks are executed in parallel
- Workers do not see each others outputs
- Outputs can be compared via decision tasks, as before
- May be difficult to merge content



Experiments

- Little, Chilton, Goldman, and Miller performed 3 experiments on MTurk to compare iterative v. parallel patterns
- Writing image descriptions
- Transcribing obscured texts
- Brainstorming company names

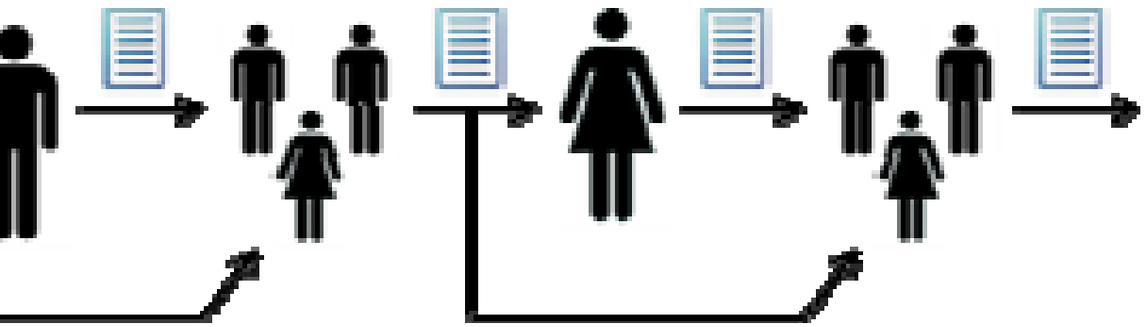
Image description experimental setup

- Selected 30 engaging images from http://www.publicdomainpictures.net
- Each image went through 6 creation tasks, and 5 comparison tasks (with 5 people voting on the comparisons)
- Run on MTurk. Paid $0.02 for creation, and $0.01 for comparison.

- Please describe the text factually
- (You may use the provided text as a starting point, or delete it and start over)
- Use no more than 500 characters

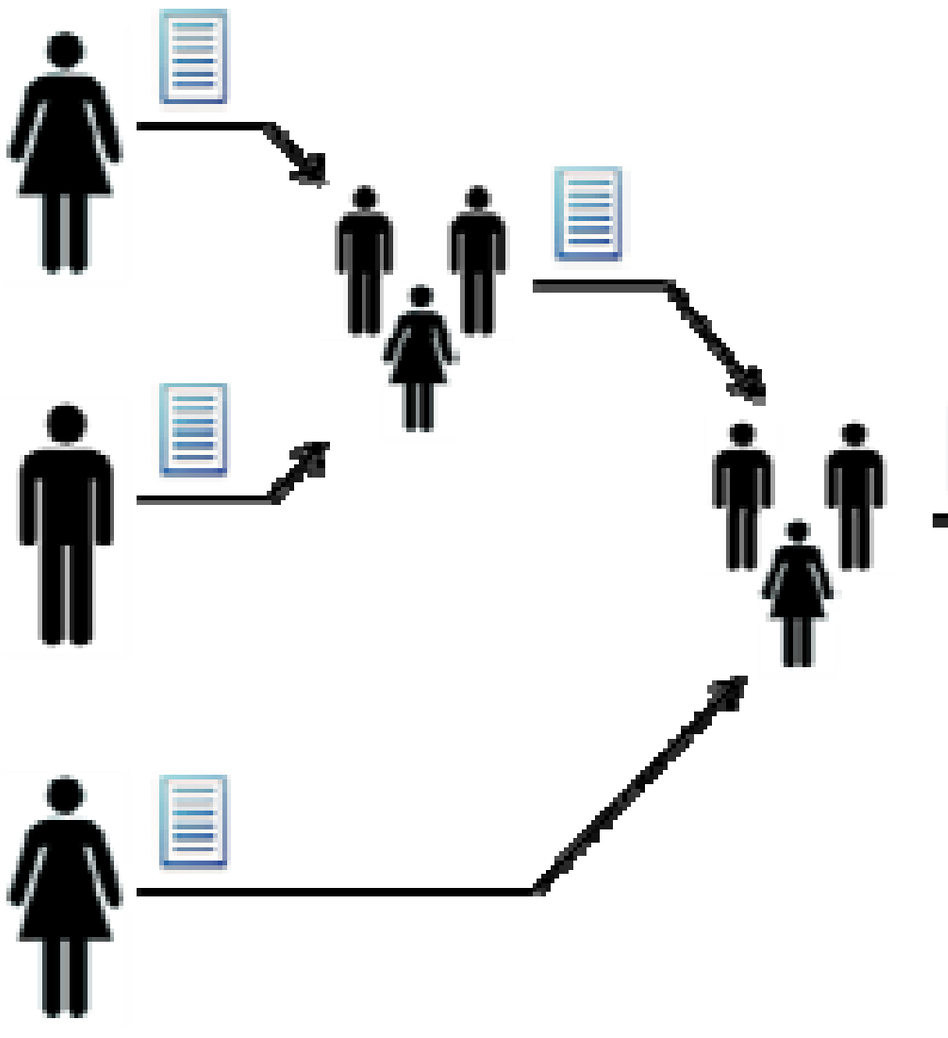
Lightening strike in a blue sky near a tree and a building.

- Iteration 1: Lightening strike in a blue sky near a tree and a building.
- Iteration 2: The image depicts a strike of fork lightening, striking ablue sky over a silhoutted building and trees. (4/5 votes)
- Iteration 3: The image depicts a strike of fork lightning, against a blue sky with a few white clouds over a silhouetted building and trees. (5/5 votes)
- Iteration 4: ~~The image depicts a strike of fork lightning, against a blue sky- wonderful capture of the nature.~~ (1/5 votes)
- Iteration 5: This image shows a large white strike of lightning coming down from a blue sky with the tops of the trees and rooftop peaking from the bottom. (3/5 votes)
- Iteration 6: This image shows a large white strike of lightning coming down from a blue sky with the silhouettes of tops of the trees and rooftop peeking from the bottom. The sky is a dark blue and the lightening is a contrasting bright white. The lightening has many arms of electricity coming off of it. (4/5 votes)



This image shows a large white strike of lightning coming down from a blue sky with the silhouettes of tops of the trees and rooftop peeking from the bottom. The sky is a dark blue and the lightening is a contrasting bright white. The lightening has many arms of electricity coming off of it.

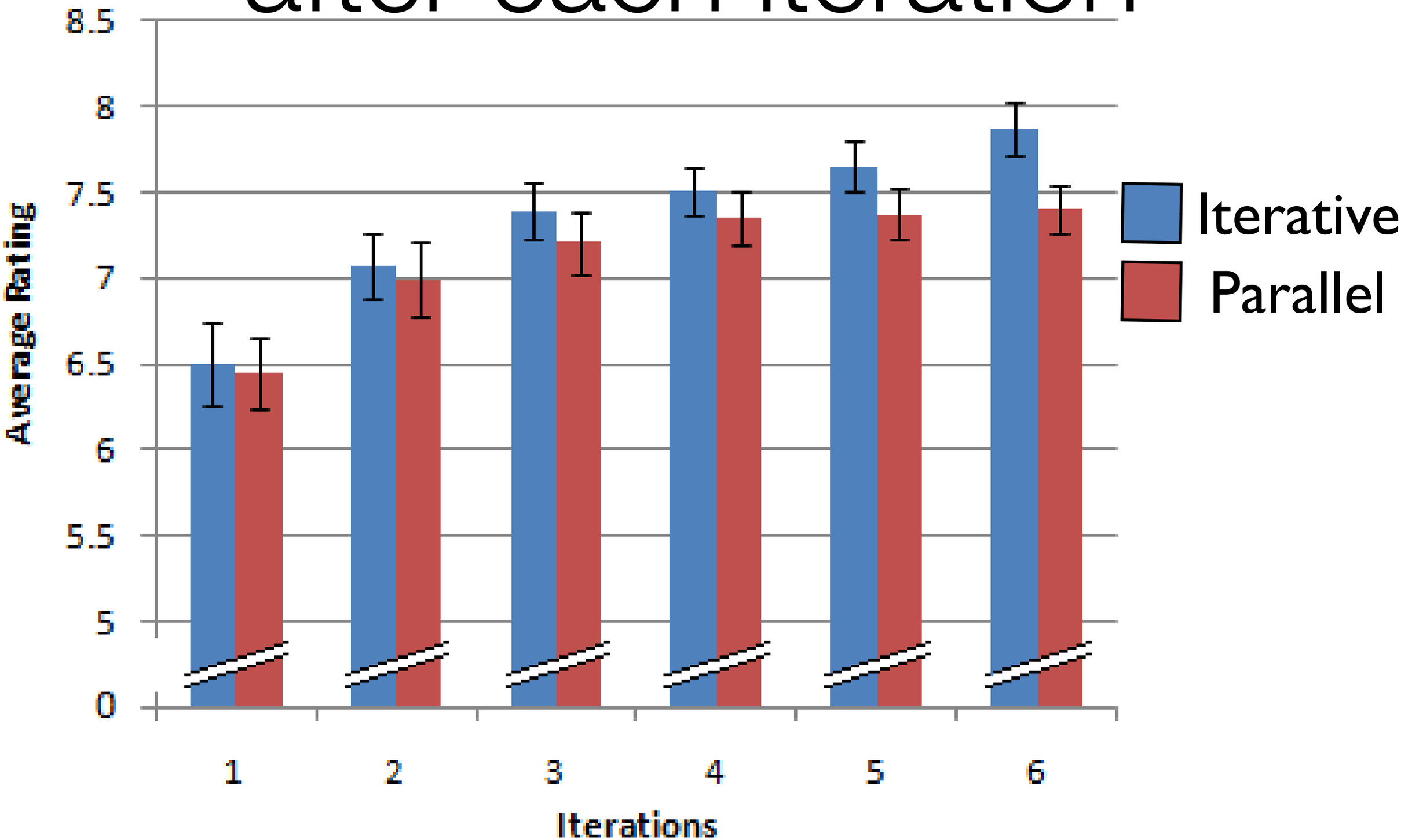
Average Rating: 8.7



White lightning n a root-like formation shown against a slightly wispy clouded, blue sky, flashing from top to bottom. Bottom fifth of image shows silhouette of trees and a building.

Average Rating: 7.2

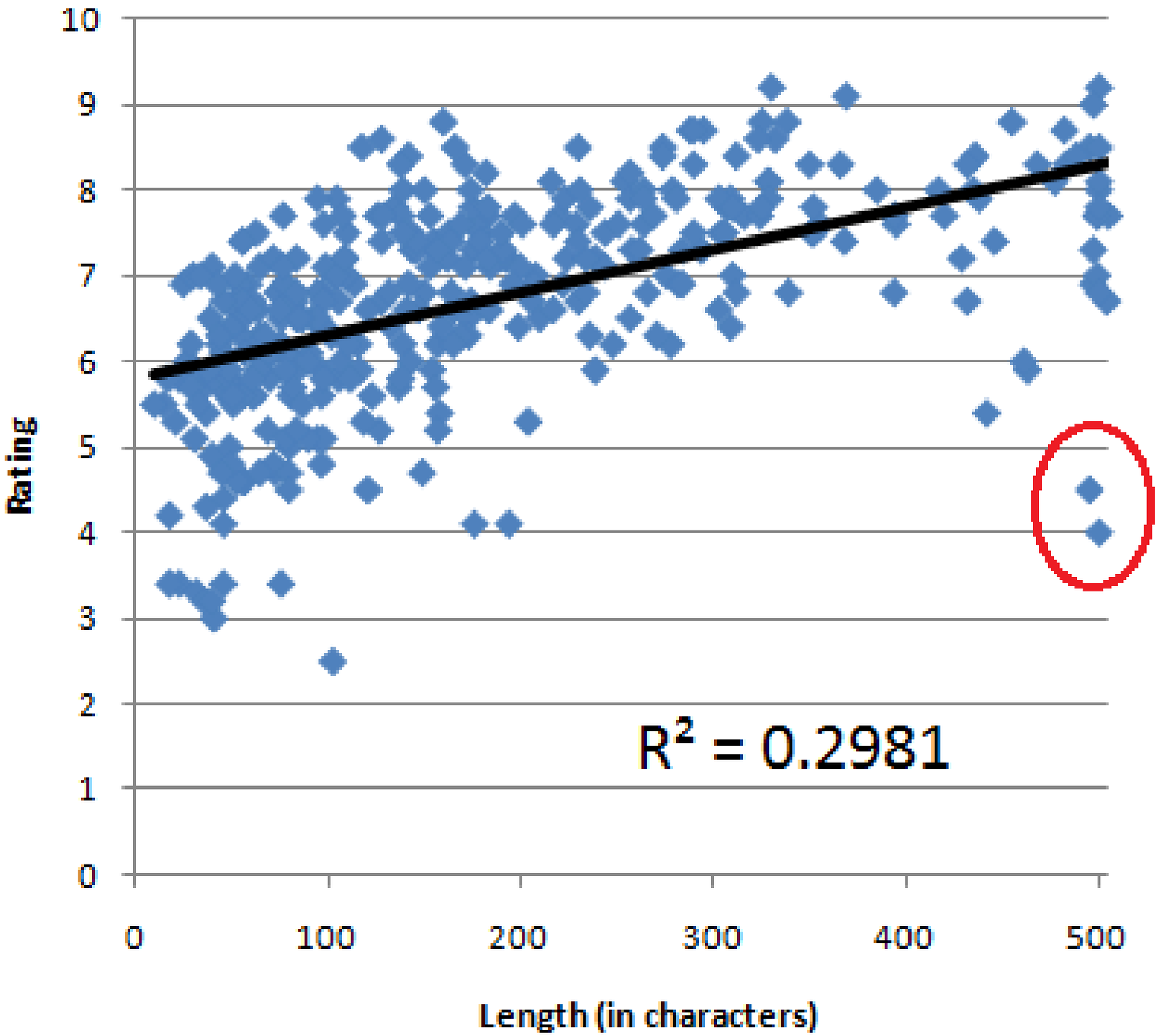
Relative improvements after each iteration



What do Workers do at each iteration

- **31%** mainly append content at the end, make only minor modifications (if any) to existing content
- **27%** modify/expand existing content, but it is evident that they use the provided description as a basis
- **17%** seem to ignore the provided description entirely and start over
- **13%** mostly trim or remove content
- **11%** make very small changes (adding a word, fixing a misspelling)

Correlation with description length and rating



Experiment 2: Brainstorming Names

- Presented descriptions of 6 fictional companies
- Asked Turkers to list 5 names each
- Iteration had 6 tasks for each company, Turkers are shown the names so far
- Parallel had 6 independent Turkers for each company

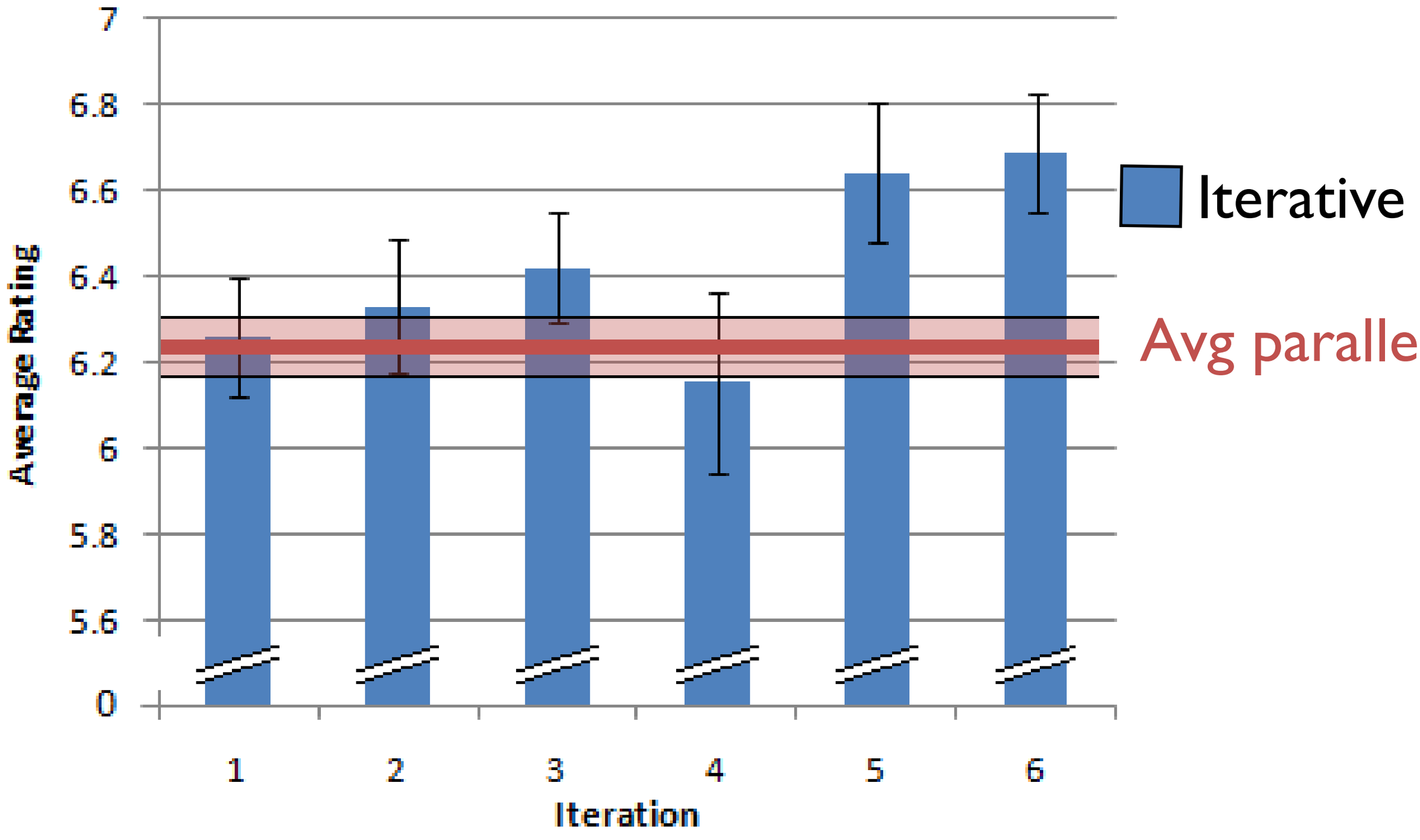
Brainstorming

- Our company sells headphones. There are many types and styles available. They are useful in different circumstances. Our site helps users assess their needs, and get the pair of headphones that is right for them.
- Please suggest 5 new company names for this company.

Example names

Iterative		**Parallel**	
Easy on the Ears	7.3	music brain	8.3
Easy Listening	7.1	Headphone House	7.4
Music Explorer	7.1	Headshop	7
Right Choice Headphone	7.1	Talkie	6.8
...		...	
Least noisy hearer	5.1	company sell	4.3
Headphony	4.9	head phones r us	4.2
Shop Headphone	4.8	different circumstances	3.7

Iterative improvements



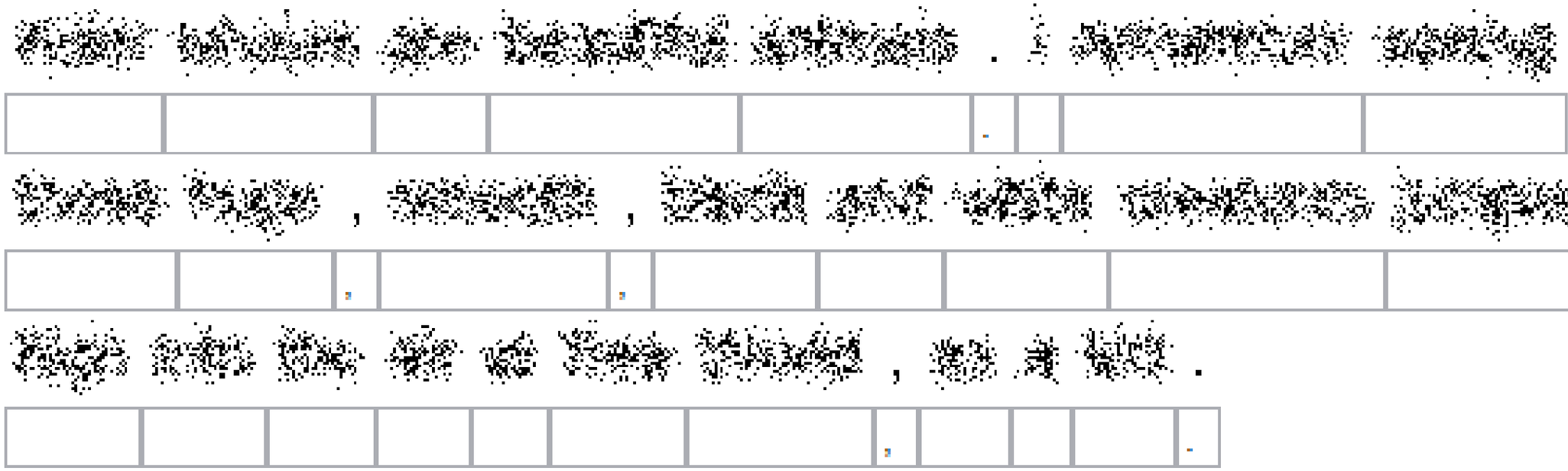
Getting the best name

- Iteration seems to increase the average rating of new names
- Not clear that iteration is the right choice for generating the best rated names
- Iterative process has a lower variance: 0.68 compared with 0.9 for the parallel process
- Showing turkers suggestions may cause them to riff on the best ideas they see, but makes them unlikely to think too far afield from those ideas

Experiment 3: Blurry text recognition

- Human OCR, inspired by reCAPTCHA
- “We considered other puzzle possibilities, but were concerned that they might be too fun”
- 16 creation task in both iterative and parallel processing

Blurry Text Transcription



Choosing the best result

- If a particular word is guessed a plurality of times, then choose it
- Otherwise pick at random from the words that tied for best

- Please transcribe as many words as you can.
- Put a * in front of words you are unsure about.

If	a	*festival			*two	*me		.	*but		*is

	If		.		*two		If				

*festival		.								*festival	.

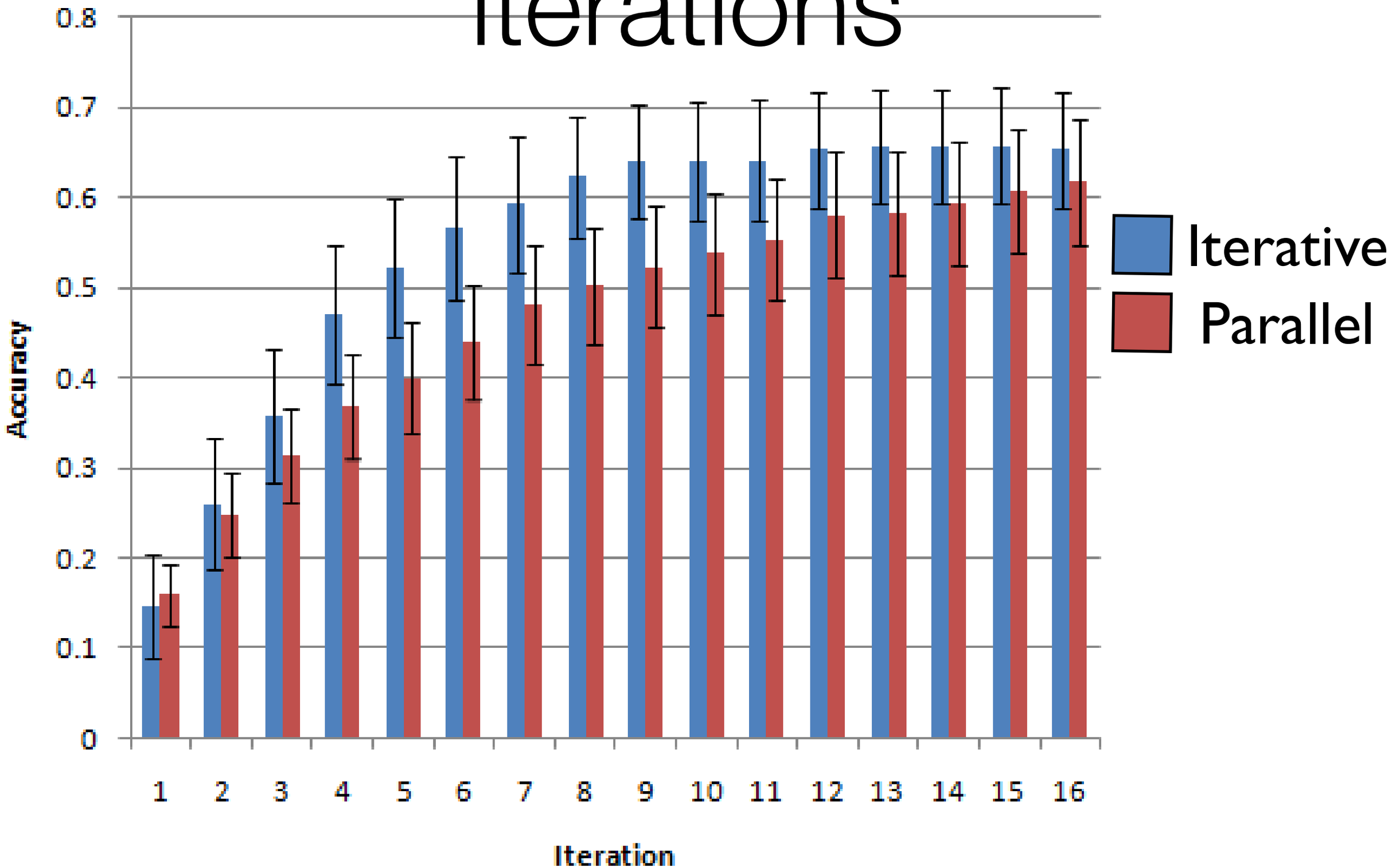
Submit

- Please transcribe as many words as you can.
- Put a * in front of words you are unsure about.

Iterative: TV is supposed to be bad for you, but I ~~am~~ watching some TV shows. I think some TV shows are really entertaining, and I think it is good to be ~~watched~~. *(94% correct)*

Parallel: TV is supposed to be bad for you, but I like watching some TV shows. I think some TV shows are really ~~advertising~~, and I think it is good to be entertained. *(97% correct)*

Accuracy after several iterations



Sometimes poor initial guesses cause problems

- **8th iteration**: “Please do ~~ask~~ *anything ~~you need *me~~. Everything is ~~going fine, there~~ * * , ~~show me then~~ * * anything you ~~desire~~.”

- **16th iteration**: “Please do ~~ask *about~~ anything ~~you need *me~~. Everything is going fine, there *were * , show me then ~~*bring~~ * anything you ~~desire~~.”

- Several of the workers doing the task in the parallel condition got it 100% correct

Discussion

- What do these results tell us about iterative versus parallel processing in human computation?
- Are the experiments well formulated?
- Is James Surowiecki right?

Tradeoff between Average and Best

- The brainstorming task showed tradeoff between increasing the average quality v. increasing the chance of finding the best
- Showing previous work increased quality, but decreased variance

Leading people astray

- The blurry text task showed initially bad guesses can lead to poorer quality later
- Suggests that a hybrid approach may be better: start multiple iterative jobs in parallel

Future Work

Recap: Model

	dependently (iteratively)	independently (in parallel)
creation tasks		
decision tasks		

What factors affect Creation Tasks?

- How much does the reward affect quality?
- How much work is expected? Is it better to break the task down into smaller pieces?
- Are examples are shown? Is prior work shown?

What factors affect Decision Tasks?

- Goal is to determine the best items in a set
- What's the best way to achieve this?
  - Absolute ratings?
  - Pair-wise comparisons?
  - Sorting multiple items in a single task?

New building blocks

- What other building blocks exist?
- What paradigms and metaphors should we use to think about human computation?

HW6 has been released.
It is due in 2 weeks.

There will be 2 assignments that run concurrently with it, so start early