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The Science And Politics Of Counting The Crowds At The Inauguration And Women's March

Organizers have reason to exaggerate, but AI and eyes in the sky are starting to provide a much better estimate of how many people show up.



[Photo: Flickr user FadilahPH]



[SEAN CAPTAIN](#) | 01.20.17 | 12:00 PM



Public events are a numbers game. If a hundred people show up at a protest in Washington, D.C., who cares? But a hundred thousand? Okay, let's hear what they have to say. With a country fiercely split politically, each side will be bringing out as many supporters as they can today and tomorrow: conservatives with the inauguration of President-elect Donald Trump on Friday, and liberals with the Women's March on Washington on Saturday. The high estimate for the Inauguration is 800,000 people, while 215,000 people have registered for the Women's March on the event's Facebook page. (There are also Women's Marches planned for other major U.S. cities.) Each side will have an incentive to exaggerate their turnout, and expect plenty of heated debate about the numbers this weekend. But technology is making it harder for them to stretch the truth.

We can expect especially accurate estimates for the Women's March in D.C., though the best count probably won't be out until several days later. Unlike Friday's Inauguration,

which is a no-fly zone, the Saturday protest will be photographed from the air. At least one firm, Digital Design and Imaging Service (DDIS), will do a tally based on a combination of high-tech tools and grunt work.

The company gained notoriety (and the ire of organizers) for counting Glenn Beck's August 2010 Restoring Honor rally at the Lincoln Memorial. NBC estimated 300,000 attendees, and Beck said there might have been up to 650,000. CBS, which hired DDIS to do a count, came up with 80,000 using a pretty thorough method.

DIVIDE AND COUNTER

For that rally, DDIS surveyed the National Mall before the event and produced a 3D map dividing it into different sections; it also estimated where people are most likely to congregate (like by the stage or under trees in hot, sunny weather). The company flew a tethered aerostat balloon carrying a nine-camera array a few hundred feet over the event to capture 360-degree panoramic images at various heights (to get different angles on the crowd).

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Then came the grunt work: Counting heads in the photos. Fortunately, they didn't have to count every single person. Rather, DDIS categorized the grids by how densely people were packed. If there were 500 people in one grid, that count was multiplied by the number of grids that it estimated to be equally dense with people. DDIS used the same method for the Steven Colbert-John Stewart Rally to Restore Sanity and/or Fear in October 2010 (estimated at 87,000).



Crowd count for Glenn Beck's 2010 rally. Courtesy: DDIS

It will fly again over the Women's March on January 21, providing counts for two media organizations, says company president Curt Westergard, without naming the clients. The technology hasn't changed much since 2010.

"Our 3D computer-generated, hand-counted polygon system is pretty well perfected. No evolution needed on that," boasts Westergard in an email. "Any advance would be airspace politics," he adds, noting that he won't be able to fly over the inauguration with a balloon (or drone). Westergard did fly over the site of Barack Obama's first inauguration, in 2009, but for security reasons (outgoing President Bush arrived earlier than expected) had to bring the balloon down long before the event started and the full crowd materialized.

THE VIEW FROM SPACE

Satellites will be flying over Trump's inauguration, as they did in 2009.

Journalism professor Stephen Doig, one of the gurus of crowd counting, used an image from satellite company GeoEye to estimate a crowd of 800,000 people for Obama's first Inauguration. Official estimates for the event, though, were over twice as high, at 1.8 million, which may actually be impossible, say researchers. DDIS modeled how big a very tightly packed crowd of a million people would stretch back from the Capitol building

along the Mall: It would extend across the Potomac River into Virginia.

Attendance at Trump's inauguration is forecast to be up to 800,000, according to the U.S. Armed Forces Joint Task Force, which supports the ceremony. When final numbers come in, the 800,000 estimated for Trump may also prove wildly optimistic.



A satellite image of the 2009 Inauguration. Courtesy: DigitalGlobe

DigitalGlobe, which bought GeoEye in 2013, will be releasing photos of the inauguration, as well as the Women's March; other satellite firms will likely be taking pictures, too. There are some drawbacks for shots from so high up—nearly 400 miles versus about 700 feet for a balloon.

"Although satellite imagery is a very good resource for crowd counting, using only satellite imagery is not going to be the most

accurate method," says Charlie Loyd, imagery engineer at Mapbox, a mapping company that uses satellite imagery from DigitalGlobe. Its new satellites can capture details down to a resolution of about a foot (30 centimeters) across. "That's on the edge of what works reasonably well for crowd size estimation," says Loyd, in an email. "You still get problems like people standing in each other's shadows and therefore not being fully resolved." However, it's an improvement from the 20-inches (50cm) resolution in the 2009 photos.

AI TO THE RESCUE?

Cutting-edge satellites, 3D modeling, and hand-counting people's heads make for an incongruous combination. The artificial intelligence wave that's sweeping across what seems like every business is finally coming to crowd estimates. In 2015, researchers at the University of Central Florida (UCF) debuted algorithms that proved to be as accurate as hand counting, and a hell of a lot faster. The first big test came in counting the turnout at a September, 2015 pro-independence rally for the Catalonia region of Spain. Researchers at the Pompeu Fabra University in Barcelona provided 67 photos that together covered the entire crowd. Within a half hour, the Central Florida team had a tally: 530,000. That might be big by U.S. protest standards, but

it's considerably less than the estimates given by the Catalonia organizers.

The Barcelona academics checked the results by hand-counting some of the images. "They were fairly close to each other, so that's why they didn't bother manually counting for all of them," says Haroon Idrees of the UCF team. Their system works on several levels, all based on machine learning—analyzing many photos of crowds to recognize how people may appear. If the crowd is small enough, like a few thousand, the system can often pick out individual's heads from an areal view. "You need 15 x 15 [pixels per person] or slightly more than that, to get good accuracy," says Idrees. This is where the accuracy roughly matches what a human can do, but it's far faster.

UCF's system can keep counting when the images are too poor for people to make sense of. "Even if the humans are not able to count by hand, our algorithms still give good results, because we can train our algorithms based on some blurred images," says Idrees. "The accuracy may go down slightly but still the accuracy will be better than human counting." The UCF effort can go even farther, sampling patterns of light and dark pixels, for instance, to make a guess at how many people are present in a photo where

nothing that a human eye would recognize as a person is present.

UCF's system probably won't be used for the Inauguration or Women's march. The university provides the technology for crowd counting, but only works on specific projects when other people, like the Barcelona researchers, approach them. "Regarding the anticipated Washington crowds, we haven't been contacted by anyone so far," says Idrees.

The university's biggest collaboration right now is with a Saudi Arabian organization that counts crowds of worshippers visiting Mecca. The annual Haj pilgrimage suffers from unwieldy crowds that often break into fatal stampedes. It's one major public event where organizers are actually hoping and praying for a smaller turnout.

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[RICH BELLIS](#) | 01.24.17 | 5:00 AM



By this time in January, some of that initial excitement around New Year's resolutions may be starting to fade. Here we are, just a week away from the whateverness of February. Work has officially kicked back into high gear. That yoga class you took on January 6th ("2017! The year of yoga!") was

great, and maybe the one you dragged yourself to a week later was fine, but last week you just kind of skipped it (you had good reasons, you swear).

Listen, it's okay. Even the most productive people have a hard time sticking with their resolutions. Making big, lasting habit changes is hard. So for inspiration (and solidarity), we asked insiders at some of the top tech companies to share which bad habits they're trying to cut out of their workdays. After all, sometimes getting yourself to stop doing something is a little easier than learning to do something totally new. And knocking out those small, achievable goals first can help you achieve the tougher ones later.

1. TAKING PHONES INTO MEETINGS

"I'm used to constantly checking my phone during the day," says Sara Haider, a senior manager in Periscope's engineering division, "so I'm aiming to switch it to 'do not disturb' mode during meetings so I can stay focused and keep my mind and thoughts on the subject at hand."



That's a challenge when the subject at hand is one of the world's most recognized mobile apps. "When you work on platforms like

Sarah Haider, Staff
Software Engineer,
Periscope.tv *[Photo:
via Twitter]*

Twitter and Periscope,"
Haider concedes, "there can
be a lot of notifications
because something is
always happening in the world."

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Erica Lockheimer, senior director of engineering growth at LinkedIn, is committing to the same thing. "I am no longer going to be distracted by my laptop or phone in meetings," she vows. "I am going to be present and fully engaged, and will enjoy every moment working with talented teams to solve problems and come up with new strategies. The rest can wait—the moment is more important!"

2. EATING LUNCH ALONE

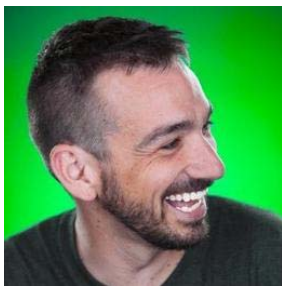
It's easy to settle for a sad desk lunch when you've got a packed day. But schlepping to the lunch room for a quick bite by yourself isn't much better, says LinkedIn's Ish

Verduzco, a social media and event coordinator. "Eating alone is not a break, it's isolation."

So in addition to kicking this bad habit, Verduzco is taking on a new one. "In 2017, I am going to have lunch with two new people each week. Not only will this build relationships," he says, "it'll also expand my knowledge across the business."

3. OPTING FOR EMAIL OVER FACE TIME

"I'm dropping the need to chime in to every email," Google product strategist Luke Leonhard declares. "When people do great work, I'll make the effort to tell them in person, instead of joining in on the congratulations thread."



Luke Leonhard,
Enterprise Senior
Program Manager,
Google *[Photo: via
LinkedIn]*

Email is convenient, but sometimes it's too convenient, and it winds up incentivizing weak and ineffective communication. So Leonhard is making physical conversations his default. "When I have feedback on a product spec, I'm scheduling a 10–15 minute meeting, in person or via Hangouts, to quickly and more effectively give feedback. If it isn't worth an in-person meeting, I doubt

it's worth me writing an email, and the recipient having to read and interpret it."

Leonhard says he's already begun to implement this, and has already "noticed I spend less time frantically typing on my keyboard at my desk, and more time interacting with real people—making the workday feel a bit more fun."

4. STAYING SUBSCRIBED TO POINTLESS NEWSLETTERS

Leonhard isn't the only one who wants to spend less time rifling through his inbox. Fadia Kader, senior manager of music partnerships at Twitter, says, "This year I'm focusing on unsubscribing from newsletters and email subscriptions that I don't read regularly, and being more mindful of the things I sign up for." 2017 will be the year she can finally "keep my work inbox organized and clutter free."

5. RELYING ON PAPER, POST-ITS, AND SHORT-TERM MEMORY



Even tech workers still cling to analog work habits that digital tools can make more efficient. No longer, says Wade Morgan, an enterprise sales development representative at LinkedIn. "I'm going to

Wade Morgan, Mid-Market and Enterprise Sales Development Representative, LinkedIn [*Photo: via LinkedIn*]

start using the calendar app to plan out my duties for the week and let go of making constant in-the-moment decisions." Getting calendar alerts, he hopes, will help "increase efficiency and make me more accountable" day-to-day.

Alex Josephson, head of global brand strategy at Twitter, is also kicking his reliance on old-school organizational habits that don't work as well. "I've decided to give up entirely on physical notebooks and pens. Using apps like Google Keep is the best way to travel light to meetings, jot down notes, ideas, and to-dos," he says. "Plus, it reduces my carbon footprint."

6. SLEEPING TOO LITTLE

"I have stopped pretending that sleep isn't important, so I have made it a point to get some this year," jokes David Roter, head of agency development at Twitter. But kicking his sleepless-nights habit doesn't mean overhauling everything. Roter is making smaller adjustments to help him score more shut-eye. "While I'm not giving up Netflix, I keep the mobile phone in the kitchen and meditate at least once per day. I actually feel sharper and more focused at work."

7. PERFECTIONISM

Googler Luke Leonhard is actually kicking two work habits. "I'm no longer spending time making internal presentations pixel-perfect," he says. "I'm sticking with using templates and Slides Explore to make presentations look great, without spending 20 extra minutes adjusting alignments and picking colors." It's just not worth it, he says.

By ditching the perfectionism, Leonhard plans to free up time to try something new. "Add up that saved time, and I can learn a little Spanish, go outside for a run, or give yoga a try." Namaste.

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[ROSE PASTORE](#) | 01.24.17 | 6:00 AM



Fast Company is excited to announce the addition of 170 new members to the Most Creative People in Business, an exclusive group of influencers in business from across the economy and around the globe.

These men and women have worked on fascinating projects at organizations as diverse as Google, Sweetgreen, Slack, Under Armour, BuzzFeed, the U.S. Digital Service, and Sesame Workshop. As scientists, managers, programmers, comedians, designers, musicians, writers, and activists, they are each working to solve global and societal problems in creative ways.

Here are the 170 pioneers that we are proud to induct into the Most Creative People in Business community. Click on their names to learn why they inspired us over the past year.

DESIGN

Tim Allen, president of Wolff Olins North America

Carly Ayres, partner at HAWRAF

Ayse Birsal, cofounder and creative director of Birsal + Seck

Amber Cartwright, design manager at Airbnb

Jeremy Goldberg, product designer at
Facebook

Kat Holmes, principal design director at
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David Lee, chief creative officer at
Squarespace

Jonathan Lee, creative director at Google

Dennis Maloney, chief digital officer at
Domino's

Bobby C. Martin Jr., cofounder of OCD |
The Original Champions of Design

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Ryue Nishizawa, partner at SANAA
Architects

Gretchen Rubin, author

Thomas Woltz, principal at Nelson Byrd
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Lesley Grossblatt, chief operating officer and VP of product at The Boardlist

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Jenny Lay-Flurrie, chief accessibility officer at Microsoft

Crystal Martin, CoderGirl program manager at LaunchCode

Jim McKelvey, founder of LaunchCode

Candice Morgan, head of diversity at Pinterest

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Susanne Daniels, global head of original content at YouTube

Stephen Davis, chief content officer at

Hasbro

Mike Doernberg, cofounder and CEO of
ReverbNation

Kid Fury, podcaster and creator of *The Read*

Alex Gibney, documentarian

Ilana Glazer, comic and actress

Eva Gutowski, social media influencer

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Kevin Hart, actor and comic

Abbi Jacobson, comic and actress

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Dwayne Johnson, actor

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Mike Platco, artist and social media
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Issa Rae, writer and actress

Shonda Rhimes, CEO of ShondaLand

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