GUIDE

Essential guide to people counting

This guide introduces business owners and facility managers to people counting solutions, so they can decide if implementing such a solution will be beneficial to their respective organizations

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What is people counting

Tracking foot traffic, which we also refer to as people counting, is the process of measuring the number of people that physically visit a particular environment like a retail store, public or commercial building. Although the metric acquired from this process might appear to be a simple count, it can easily be transformed into very valuable insights, usually by combining it with other information like time, location, weather, or revenue.

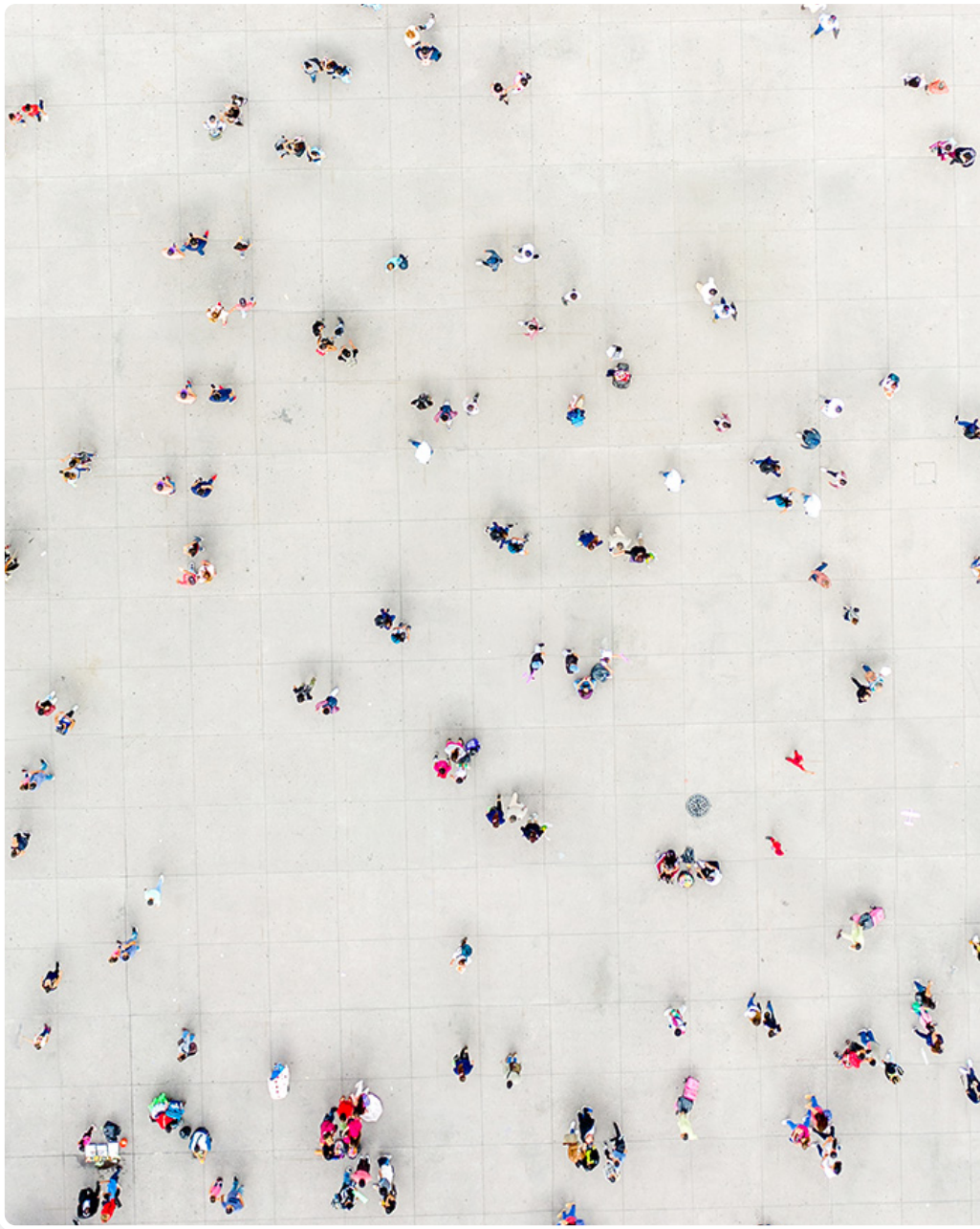
People counting is typically performed by placing some type of sensor at the entrances and exits of the environment in which we want to perform the count. The technologies on the market differ greatly when it comes to measurement accuracy, gathering additional data and privacy compliance.

When most usefully presented, all data acquired usually is transformed into an easy to read and visually appealing dashboard for end users. That same data also gets stored in databases for further analysis to determine trends and analyze historical data.

Why implement people counting

Organizations have become used to having large amounts of rich data on customers and potential customers from web traffic behavior monitoring of online stores or web-sites. The number of visitors, visitor conversion rate, peak traffic times, most visited areas, and visitor demographic can all easily be determined online. By implementing an intelligent people counting solution, organizations can gather very similar insights for physical environments too.

Below, we will summarize several examples of insights that can be derived from people counting solutions in different environments; this list is not exhaustive by any means.



- Number of visitors
- Traffic per area
- Spatial popularity
- Staff planning
- Marketing effectiveness
- Cleaning
- Occupancy
- Utilization

Museum, Library or Gallery

Number of visitors:

How many visitors did a museum, or a library attract on any given day, what did the visitor demographic look like? If there are multiple entrances, which entrances were used more often? These visitation figures can justify investments and public funding. Schedule staff, reception, and security based on number of visitors to reduce costs and be more effective.

Traffic per area:

As museums tend to consist of multiple rooms and floors, determining the amount of traffic per area is important. Managing people flow throughout the museum enhances visitor experience with live occupancy information in much frequented areas or rooms. Knowing what area people spent the most time in can help plan your next exhibition.

Spatial popularity:

Some galleries or collections are more popular than others, which cannot be discerned strictly by general admission purchases or ticketing practices. By monitoring visitor behavior and flow through the space, the effect of certain attractions can be seen, and if a deeper demographic analysis is implemented together with the people counting solution, the effect on the use of parking facilities and entrances can also be monitored and controlled.

Retail stores and shopping malls

Number of visitors:

How many visitors did a particular store attract on any given day, what did the visitor demographic look like? If the store has multiple entrances, which entrances were used more often? These visitation figures can justify rent prices for tenants in malls or concessionaires leasing floor space inside larger retail stores. Mall operators can further leverage these statistics to set prices for advertising throughout the space based on the foot traffic and attention a certain area receives.

Staff planning:

Based on the number of visitors measured over an amount of time, potentially during different seasons, a clear image can be drawn as to when most visitors are to be expected, down to the granularity of the weekday and even at what time of day. Based on this information, accurate staff planning can be achieved, restocking products, and store maintenance can be planned during low visitor times.

Marketing effectiveness:

Seeing the effect of running a marketing campaign on the number of visitors and the conversion rate shows its effectiveness. Running campaigns for brands or specific types of products might have different results.

Facility management

Cleaning:

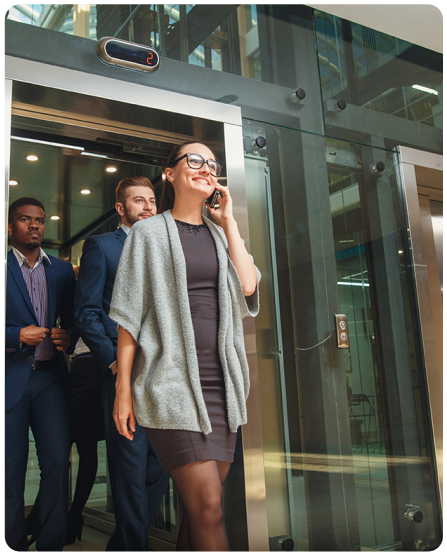
Buildings, or specific rooms/spaces that get high visitor numbers will want to optimize their resources to clean certain areas such as restrooms based on actual usage. Instead of cleaning these facilities on predefined rotations or time intervals, such as every other hour, they are optimized and cleaned after a particular threshold of usage is tracked and fed as an alert to the relevant parties. In today's competitive and costly labor markets, this will result in better utilization of resources and improved user/visitor experiences.

Utilization:

Areas like meeting rooms and cafeterias are usually in high demand during specific times. By measuring the occupancy and informing the visitors via television monitors and/or internal communication tools, usage can be load balanced in an easy and transparent way that also improves comfort levels for occupants.

Occupancy:

For building managers, occupancy is a crucial insight for staffing or expansion/retraction. As a simple example, closing the wrong location of a consolidating retail banking chain can have detrimental business effects if utilization is inaccurately assessed or estimated.



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What can be measured

The number and quality of insights one can expect from a people counting solution depends on the technology implemented and the coverage of the solution. The technology used determines what can be measured and which insights can be derived.

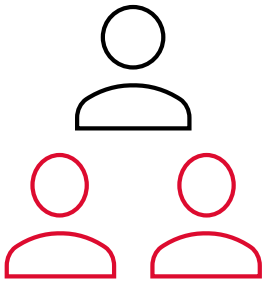
As an example, when using an infrared based counter, the number of people crossing a line can be counted and their direction can be determined if multiple beams are used. If people walk very close to each other or are holding large objects, the numbers might get skewed.

With a device like a 3D sensor, intelligent algorithms implemented on the sensor ensure very accurate people counting and additional data points. Since 3D sensors deploy a set of lenses that process a set of images very much reassembling what the human eyes and brain do, the height, the gender, and the view direction of a person can also be determined. When 3D sensors are mounted at the entrances and exits of an environment, they still primarily perform people counting. By implementing more sensors to cover a larger area, such as the entire selling floor of a retail environment, many more insights can be generated - like dwell time, view direction, walking direction, staff engagement levels, and dynamic queue detection.

Footfall

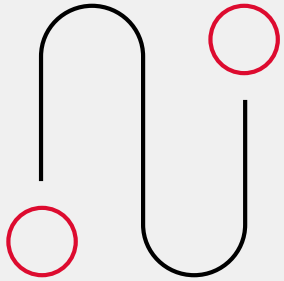
With a simple people counting sensor, footfall can be measured – this is how many people come in and how many people leave at a particular time. By combining the two data points, we can also determine occupancy. By subtracting the number of people that have left from the number of people that have entered, we know how many are still in, which is what we call occupancy.

When only counting at the point of entry and exit, a specific individual cannot be followed, so it cannot be determined how long someone has been in the environment. This can be realized by planning for full coverage of an area, so when someone is recognized by a sensor, that person can be followed during his journey in the environment. Another way of knowing when someone comes in and leaves again is by uniquely identifying that person, based on technologies in CCTV solutions with facial recognition or by tracking a device the person might be carrying, like a mobile phone. Although these two solutions give some additional insight in customer behavior, they are usually not very accurate due to low sampling size capabilities, and are privacy intrusive, which makes them banned in some countries or cities.



Group counting

When multiple people enter a store or space as a group, they usually show different behavior than individuals. They do their browsing or shopping together, influence the buying habits of others, and often one person pays for the group if a purchase is involved. Understanding the concept of groups versus the number of transactions in a retail environment provides much more relevant information for promotions, inventory management, and staffing levels than counting each person individually.



Dynamic queue detection

By expanding the people counting solution from just the entrances and exits to a ticketing counter, customer service desk, or checkout area, dynamic queue detection can also be performed. See where people get in line, how many people are in line, if people move from one line to another and maybe even leave the line altogether and abandon their purchase due to real or perceived long queue times. In staffed checkout areas, you can also measure the efficiency at a lane level to determine staff productivity.

Customer journey

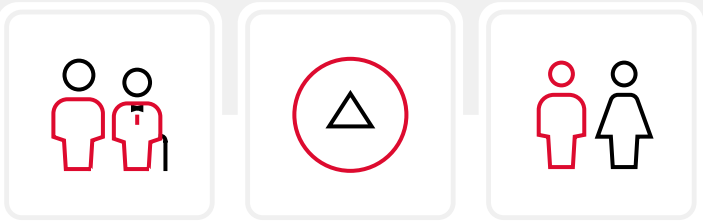
When an area is fully covered by sensors, the complete customer journey in the environment can be visualized, from the moment they enter to the moment they leave. The route they took through the space, which aisles, floors, or galleries they visited, where they spent most of their time, if they had to wait in line anywhere, and what products they looked at can provide valuable insights to numerous stakeholders of such an environment.

What can be derived

In a commercial setting, the revenue and number of transactions of the day taken from the point-of-sale installation; when combined with the number of visitors, this powerful KPI can give insights like conversion rate and average transaction size.

Based on the height of individuals, counts can be split into (young) adults versus children. Depending on the environment the counts are taken in, this can be an important factor. In stores and attractions, many young children are ignored or miscounted due to technology limitations or business practices such as free child admissions. Proper data gathering of their presence allows one could cater to this audience by providing specific facilities or offerings.

Advanced sensors can be updated with a varied suite of AI extensions for more privacy-compliant insights. Extensions that measure visitors' apparent age, gender expression, view direction, and various objects give businesses and organization deeper, more valuable statistical data.



Data analytics solutions

Analytics platforms convert the data obtained by the sensors and offer insights via an easy to consume dashboard and reports for long-term insights. Often, these solutions focus on a specific vertical, like retail stores, museums, libraries, smart buildings, or public transport to make sure they offer interesting and relevant insights.

Most platforms work with a broad range of sensors and other data sources and do not only provide people counting measurement. Sometimes they offer combined insights like people counting along with parking space availability or people counting and weather information. With the focus on specific use cases, they sometimes also offer optional integration with specific environments like heating ventilation and air-conditioning (HVAC) solutions in smart buildings.

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Privacy matters

Laws like GDPR regulations in large regions in Europe as well as more geographically pointed legislation in cities such as San Francisco are in place to protect individuals from having personal data collected and stored without our consent. Facial features are considered personal data and should not be stored in an attempt to recognize people repeatedly for commercial use. To comply with privacy laws and offer a safe environment for visitors, the people counting solution must respect local laws and not store any privacy sensitive information.