



Facial Recognition

Here's looking at you

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A report by the Deloitte AI Institute



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What is **facial recognition**
and how does it work?



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People are already using facial recognition in their everyday lives. Unlocking phones. Checking bank accounts. Tagging in social media. Both consumers and companies are benefiting from advances in artificial intelligence (AI) and machine learning-enabled facial recognition. But what exactly is it and how does it work?

Facial recognition—a biometric form of artificial intelligence identification checking done by recognizing facial features—has changed the face, quite literally, of identification. It's big business and getting bigger.



What is facial recognition and how does it work?

The facial recognition market value is expected to reach \$8.5 billion by 2025—a significant growth from \$3.8 billion in 2020.¹ Meanwhile, the emotion detection or emotion recognition market [an offshoot of facial recognition] is projected to reach \$37 billion by 2026.²

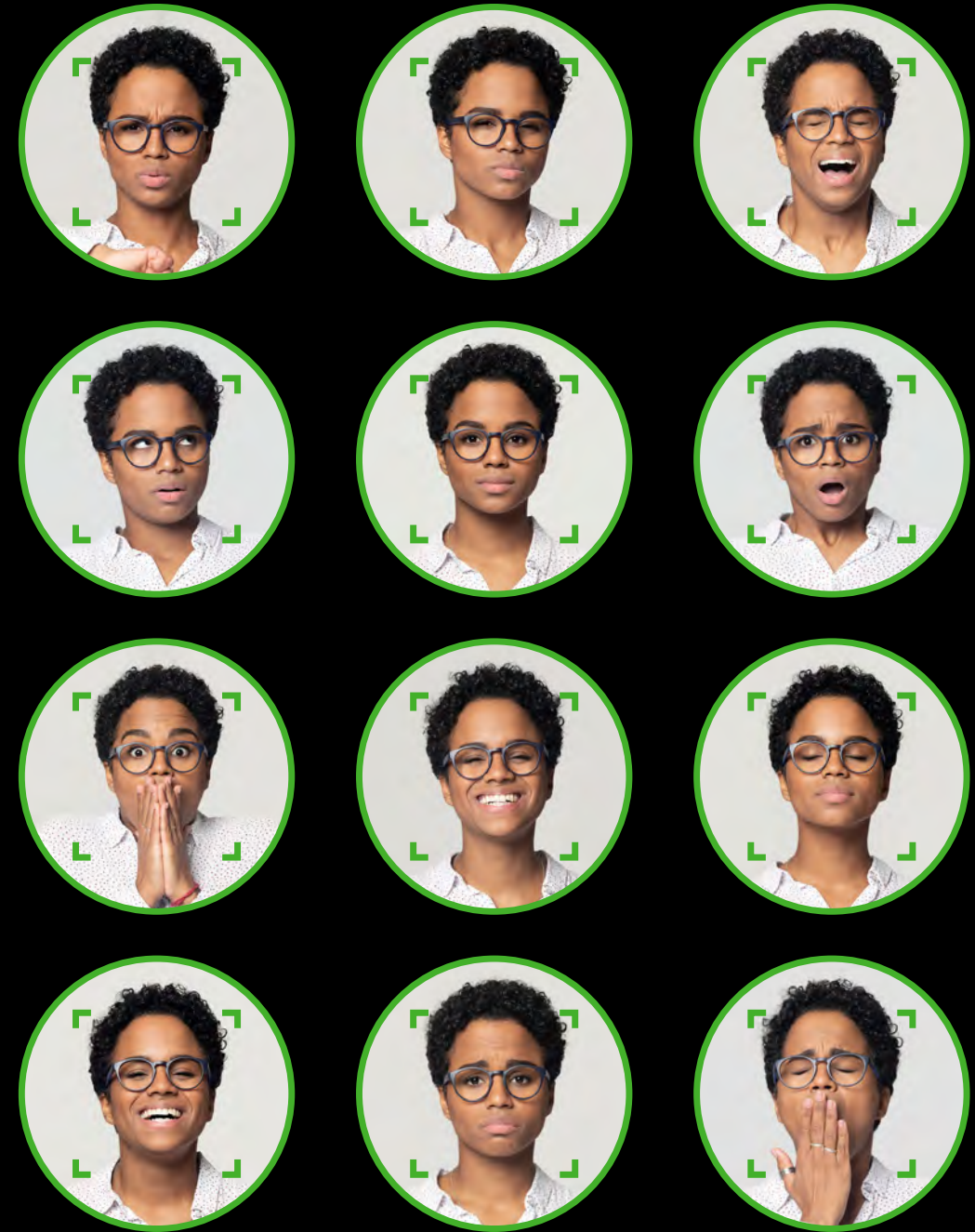
Facial recognition market value growth from 2020 to 2025

\$3.8
BILLION

2020

\$8.5
BILLION

2025



Emotion recognition market by

\$37
BILLION

2026

What is facial recognition and how does it work?

Facial recognition is used to either identify people in a 1=n relationship (who are you?) or to verify people in a 1=1 relationship (are you who you say you are?). Facial recognition works its magic in three seemingly simple steps: **detection, analysis and recognition.**³

1

Detection. First, the software will scan the image, measuring distances and shapes to your face, deciding that you are in fact a human. (It can work on pets too.)

2

Analysis. Next, it will start pin-pointing all your specific features, getting a more accurate individual reading. It measures distance between eyes, length of nose, shape of chin, and more.

3

Recognition. Then, artificial intelligence will sort through massive data points with millions of images for a match within seconds.



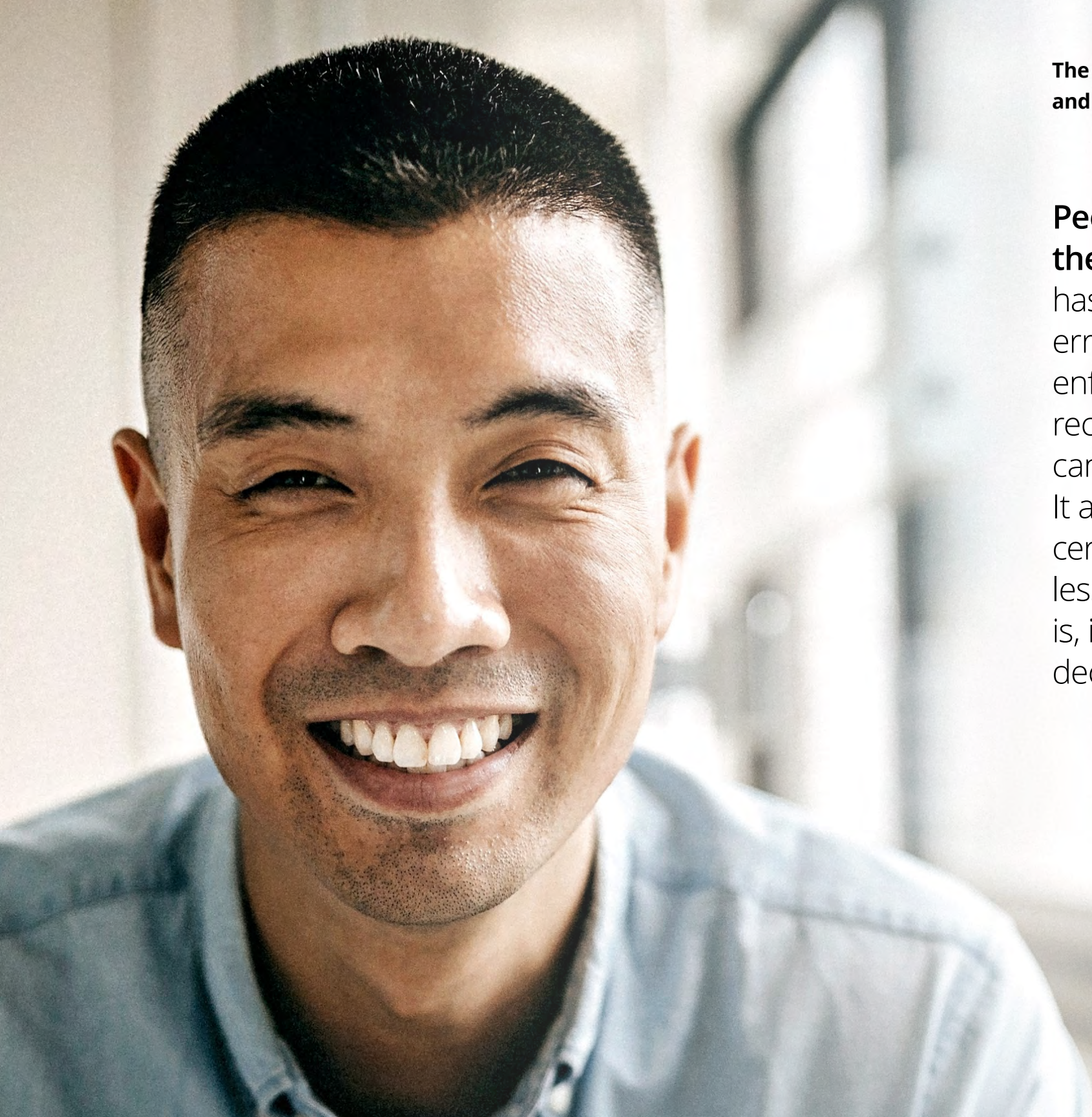
What is facial recognition and how does it work?

Humans intuitively read human emotions by glancing at someone's face. Now, facial recognition technology can too. It's often called emotion recognition. AI matches facial expression to an already learned emotion and uses that to complete its task more effectively. For example, if someone is at a self-checkout counter and starts to have trouble, frustration typically comes over their face. A camera captures that image and alerts a customer service representative to come help. It could also be used to track the metrics of smiling customers at the front desk of a hotel. Executives could then see when customer satisfaction dips and identify the root cause, like shift changes.





The technology isn't 100 percent perfect, but it's getting closer—and talk about **a world of good.**



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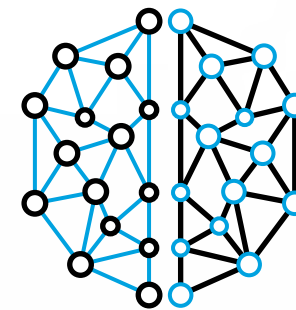
People are already using facial recognition in their everyday lives. Unlocking facial recognition has received a lot of attention around the errors and biases that were uncovered as law enforcement first started using it. It's true that facial recognition technology isn't 100 percent perfect. It can have both false positives and false negatives. It also proved to be less accurate with people of certain sex, ethnicities and even countries it was less familiar with as it first debuted. The good news is, it's a lot more sophisticated now than it was a decade ago.





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A close look at data from a new National Institute of Standards and Technology (NIST) report reveals that the best facial recognition algorithms in the world are highly accurate and have vanishingly small differences in their rates of false-positive or false-negative readings across demographic groups.⁴

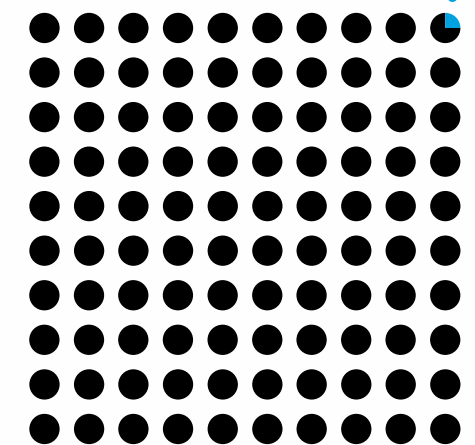


Many of the algorithms NIST has studied have accuracy rates that exceed

99%⁵

0.25%

FAILURE



Using FBI mugshots, the most accurate algorithms fail only in about **one quarter of one percent of searches**.⁶

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Facial recognition is real, it is impacting all of us and it can bring goodness and opportunity to consumers and companies alike.

Goodness for consumers

1

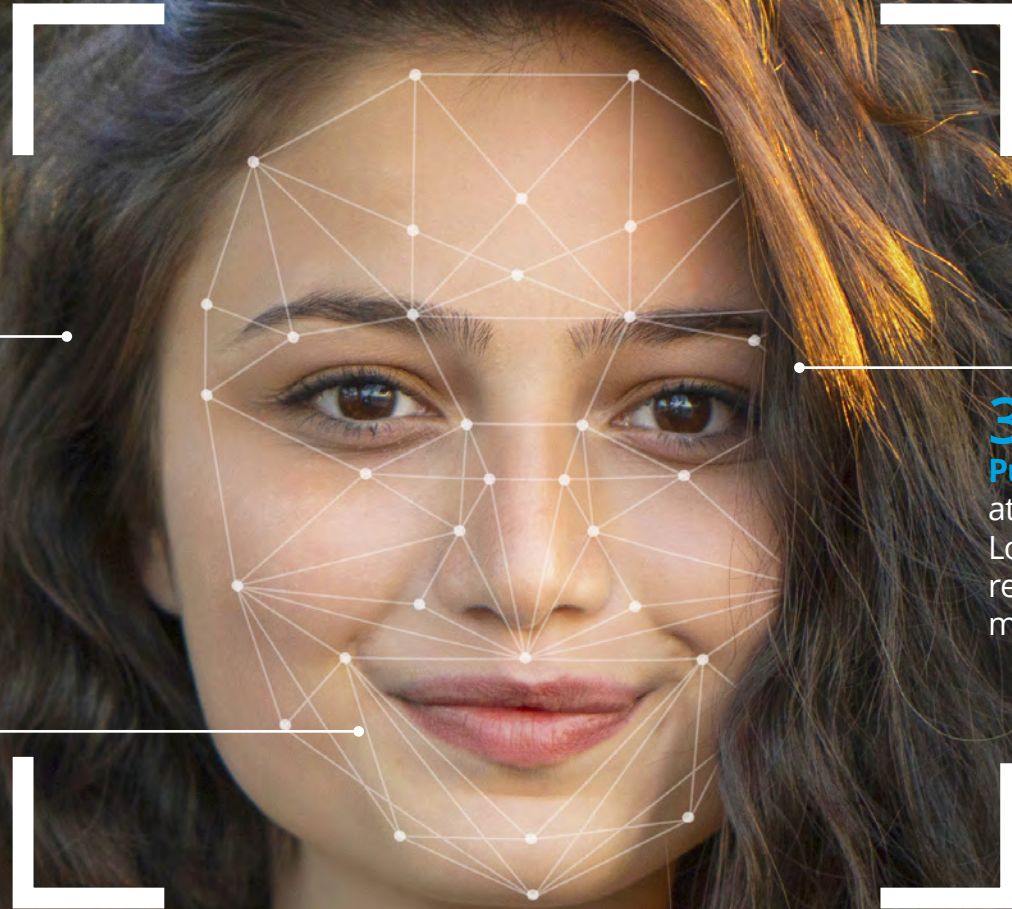
Start your car. Unlock your house. Check in at work or school just by passing through a doorway. With the development of advancing facial recognition, this is all possible in a blink of an eye.

2

It's remarkably efficient. Laptops and smart phones use facial recognition to allow users to easily unlock the devices and open secure apps. The use of facial recognition in cars will change the consumers experience significantly by starting cars, making keys virtually obsolete and allowing for a personalized consumer-based encounters by changing the seat settings and even the music.

3

Punching time clocks and taking attendance at school may become things of the past. Lost child at an amusement park? Facial recognition can help find not just them, but missing pets too.



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Goodness for organizations

1

Imagine walking down a street or in a store as ads on billboards shift to your every wish. Imagine walking into a hotel and are immediately recognized as a VIP guest. Facial recognition intelligence can vitally change the way organizations operate.

2

The retail and hospitality industries can now better tailor in-building customer experiences, which fosters loyalty and thus makes people more likely to purchase items. The health care industry is using it to identify genetic disease via facial features that are so subtle they are difficult for humans to recognize.⁷

3

Facial recognition use can not only make our online world more secure, but also our actual world. Manufacturing companies can use emotion recognition to signal accidents on assembly lines, getting help to workers faster. Law enforcement agencies all over the world have been using facial recognition software successfully in aiding investigations and arrests. In the banking industry, ATMs are implementing the use of facial recognition to protect against fraud. In travel and transportation, the software can add convenience and track potential danger by tracing travelers passing from security and onto planes. It also makes entry into places of business and stadiums more secure.



Governance for good becomes **mission-critical**

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Governance for good becomes mission-critical

While the benefits of facial recognition for business are substantial, there are potential roadblocks and pitfalls as with any new technology. Companies should govern facial recognition like any other use of artificial intelligence and keep in mind the safety and security of their consumers. Proactively monitoring regulation and addressing privacy and ethical concerns are of top priority as well as mitigating unintended bias in the algorithms.⁸ For example, early renditions of facial recognition didn't detect dark faces as well as light ones.





Governance for good becomes mission-critical

Stay ahead of regulatory and legal issues

Regulation of this intelligent software has been up for discussion and debate. Currently there are efforts at the national and state levels to push for more regulation and security. While facial recognition is secure for the most part, it can, like any other software, be hacked for nefarious purposes. The National Institute of Standards and Technology (NIST) has been testing accuracy of algorithms and data security of facial recognition along with the help of the State Department, the Department of Homeland Security and the FBI.⁹

Proactively address ethical and privacy concerns

There are ethical questions around many uses of artificial intelligence. The matter is no different with facial recognition. In some circumstances, facial recognition is conducted without a user's consent, usually by a security camera or even in the background of someone else's selfie. In the future, anonymity may become more difficult. This may make people feel weary about the technology. Where the personal biometric data is stored and the ownership of it is also a point of concern for consumers. Did they consent to its use? Organizations should have clear policies in place on how they intend to both use and govern the data.



Benefits abound:
Here's why it's
here to stay





Benefits abound: Here's why it's here to stay

The benefits of facial recognition create an interlocked and secure world of good that both consumers and companies will love.

Convenience, safety and security

The development of high-accuracy facial recognition is changing the face of convenience. Convenience is what will make consumers keep coming back and asking for more. No ATM card or no keys on you? No worries. Can't find your password or your boarding pass? Forget about it. Want to tag a friend in social media? It's automatic.

Consumers also enjoy the benefits of facial recognition from a safety and security perspective. From airports to seaports and city streets to store fronts, facial recognition is being used to protect citizens from potential danger. It can also help locate missing children and the elderly. Companies can use the technology to track repeat offenders of shoplifting or fraud as they enter their stores.



Benefits abound: Here's why it's here to stay

Customer satisfaction, relevance and revenues

For companies, facial recognition aids in both engaging the customer and improving segmentation and targeting capabilities. Whether in a bank, a retail store, a hotel or a casino, facial recognition software can identify VIPs, track customer emotions and offer promotions in real time. It helps the business to recognize customer preferences and cater to them. This kind of personalization influences satisfaction and loyalty.

With those two things in hand, the company can be in a better position to retain customers and reap the financial rewards of their loyalty.

Benefits abound: Here's why it's here to stay

The path forward

Facial recognition may not always be perfect, but it's getting close and it's definitely here to stay. As long as it is used and governed properly, it can work for the good of both consumers and companies. What global threats might it help prevent? What if you never had to stand in a checkout line again? What medical breakthroughs and health care enhancements might it enable? Which city will be the smartest? The future of facial recognition is bright.



Endnotes

- ¹ Jenny Chang, *30 Facial Recognition Statistics You Must Learn: 2021 Market Share & Data Analysis*. Finances Online, April 12, 2021.
- ² *Emotion Detection and Recognition Market by Component (Software (Facial Expression Recognition, Speech & Voice Recognition), Services), Technology, Application Area, Vertical, Region – Global Forecast to 2026*. MarketsandMarkets. 2020.
- ³ Thorin Klosowski, *Facial Recognition Is Everywhere. Here's What We Can Do About It*. New York Times Wirecutter: Reviews for the Real World. July 15, 2021.
- ⁴ Michael McLaughlin and Daniel Castro, *The Critics Were Wrong: NIST Data Shows the Best Facial Recognition Algorithms Are Neither Racist Nor Sexist*. ITIF. January 27, 2020.
- ⁵ Ibid.
- ⁶ *Facial Recognition Technology (FRT)*, NIST. February 6, 2020.
- ⁷ Kristina Grifantini, *Detecting Faces, Saving Lives How facial recognition software is changing health care*. EMBS, May 13, 2020.
- ⁸ Shalini Kantayya, *Coded Bias*. Sundance documentary. 2020.
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- ¹⁰ Pam Greenberg, *Spotlight | Facial Recognition Gaining Measured Acceptance*. National Conference of State Legislatures. September 18, 2020.





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