Top Trends in Computer Vision

Insights from CVPR 2022

October 2022

Introduction

Computer vision remains a dynamic and evolving field. Technological advances introduce new opportunities and efficiencies, and they are met with challenges in the form of new theoretical and societal considerations.

From privacy and algorithmic fairness to the feasibility of wide-scale adoption, we have entered one of the most exciting eras in computer vision.

Computer Vision Market

In Focus

$12.14 billion USD

Market size in 2022

7.0%

Compound Annual Growth Rate (CAGR)

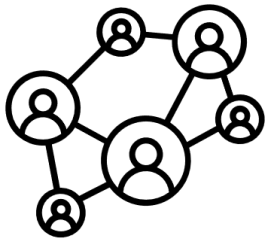
$20.88 billion USD

Market size by 2030

Source: Grand View Research

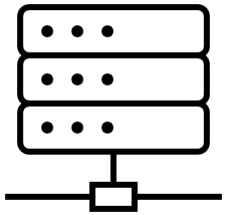
Environmental Factors Shaping Computer Vision

Increasing Industry Demand



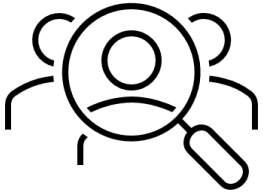
Industries ranging from finance and healthcare to retail and security and beyond are exploring how computer vision supports their emerging needs. Such emphasis means research continues to focus on ways to access and manipulate data in strategic, efficient, and highly accurate new ways.

Data Accessibility



The quality and integrity of data remains pivotal to results. Computer vision researchers are exploring how to achieve highly accurate results with smaller data sets, as well as with new techniques. In addition, more emphasis has been placed on opportunities with synthetic data to expand the use cases, availability, and address security issues around data sets.

Data Privacy and Bias



As computer vision techniques progress, how the data is used becomes a chief consideration. Advanced algorithms create unparalleled results, but personal security, bias, and societal factors come into play. Continued work will focus on the ethics surrounding these achievements.

Top Trends in Computer Vision

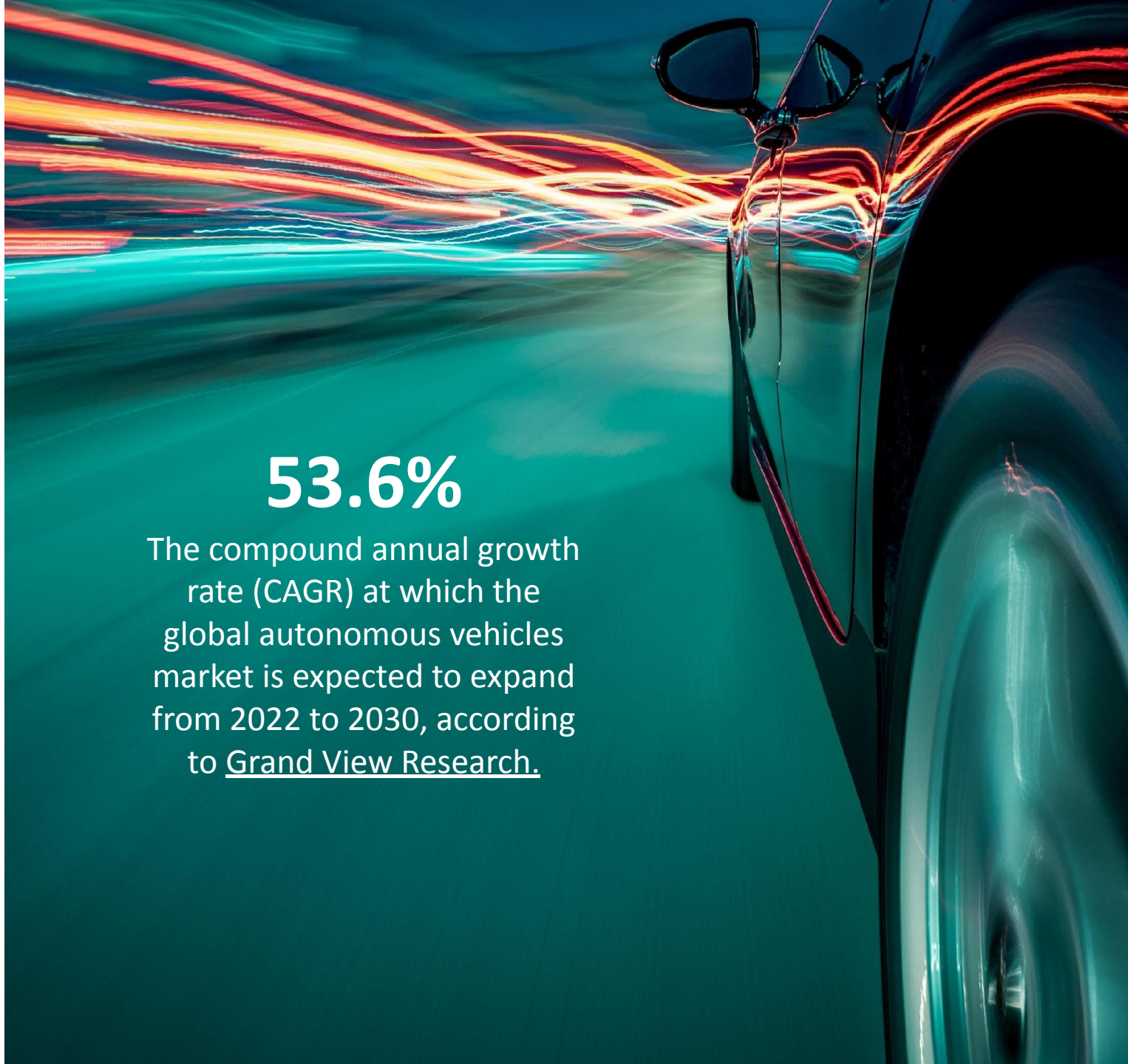
Based on these developments, today's computer vision landscape continues to evolve.

What follows is a summary of key observations, developments, and considerations for the year ahead, informed by insights from CVPR 2022.

Autonomous vehicles are gaining traction.

“There was more push towards autonomous driving with solid applications. What will happen is that even if you don’t have a 100% autonomous car, the process of trying to get there will add so many new features.”

– Rama Chellappa, John Hopkins Univ., CVPR 2022 General Chair



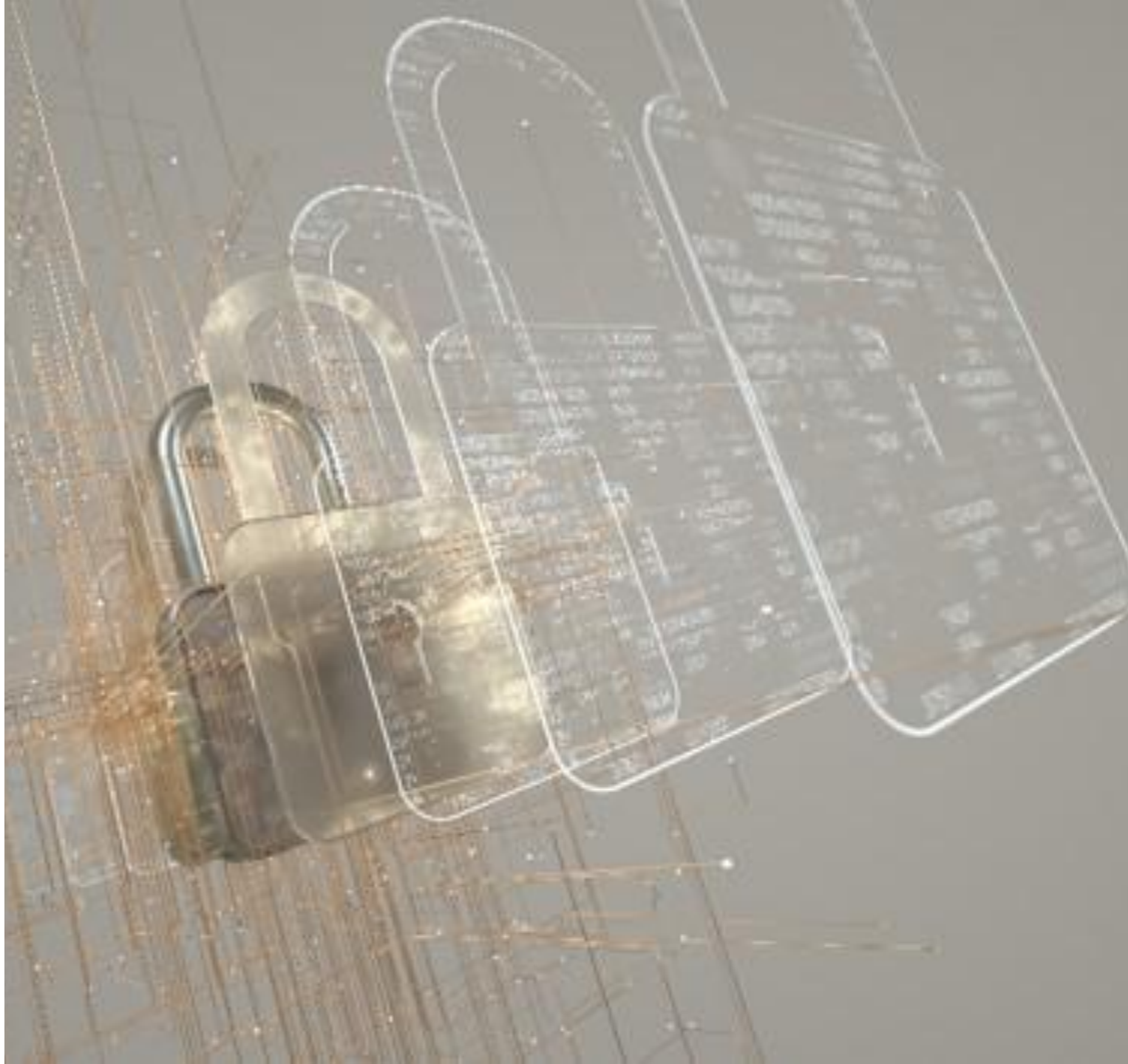
53.6%

The compound annual growth rate (CAGR) at which the global autonomous vehicles market is expected to expand from 2022 to 2030, according to Grand View Research.

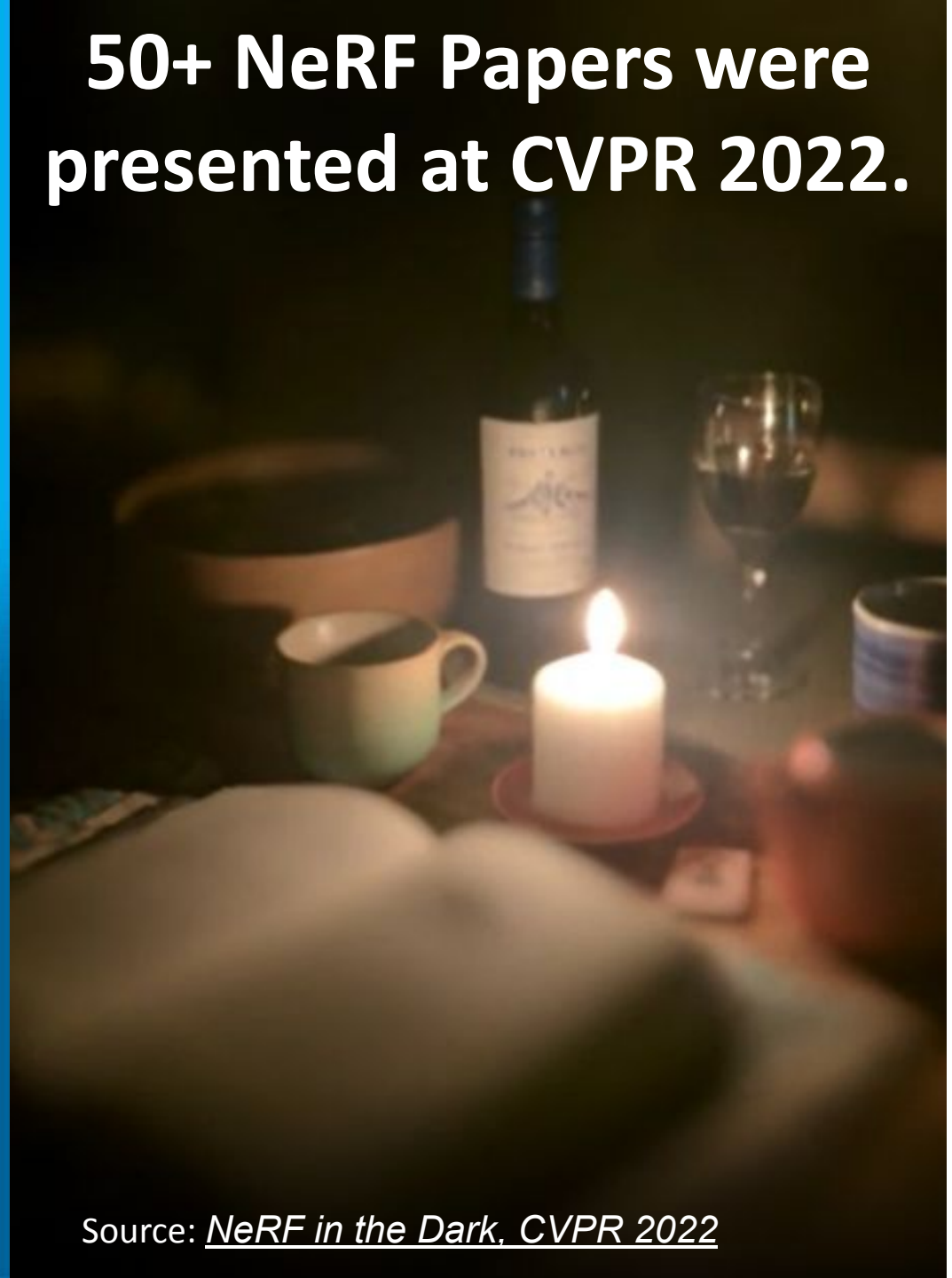
The lines between computer vision and computer graphics continue to blur.

“Half the papers in computer vision look like computer graphics. Instead of collecting data you can now simulate and that is very powerful.”

– Rama Chellappa, John Hopkins Univ., CVPR 2022 General Chair



50+ NeRF Papers were presented at CVPR 2022.



Source: *NeRF in the Dark, CVPR 2022*

With the intersection of computer graphics and computer vision, NeRF research has risen in prominence.

"NeRF research is a hot focus right now. It continues to generate jaw-dropping images and is a beautiful blend of computer graphics and computer vision. Computer vision scientists think of cameras as scientific measuring devices that can do more than capture visually pleasing 2D images. These algorithms are a continuation of that. The cameras will be designed to get better computational photography, unifying computer graphics, computational photograophy, and computer vision."

-- Kristin Dana, Rutgers University, CVPR 2022 Program Chair

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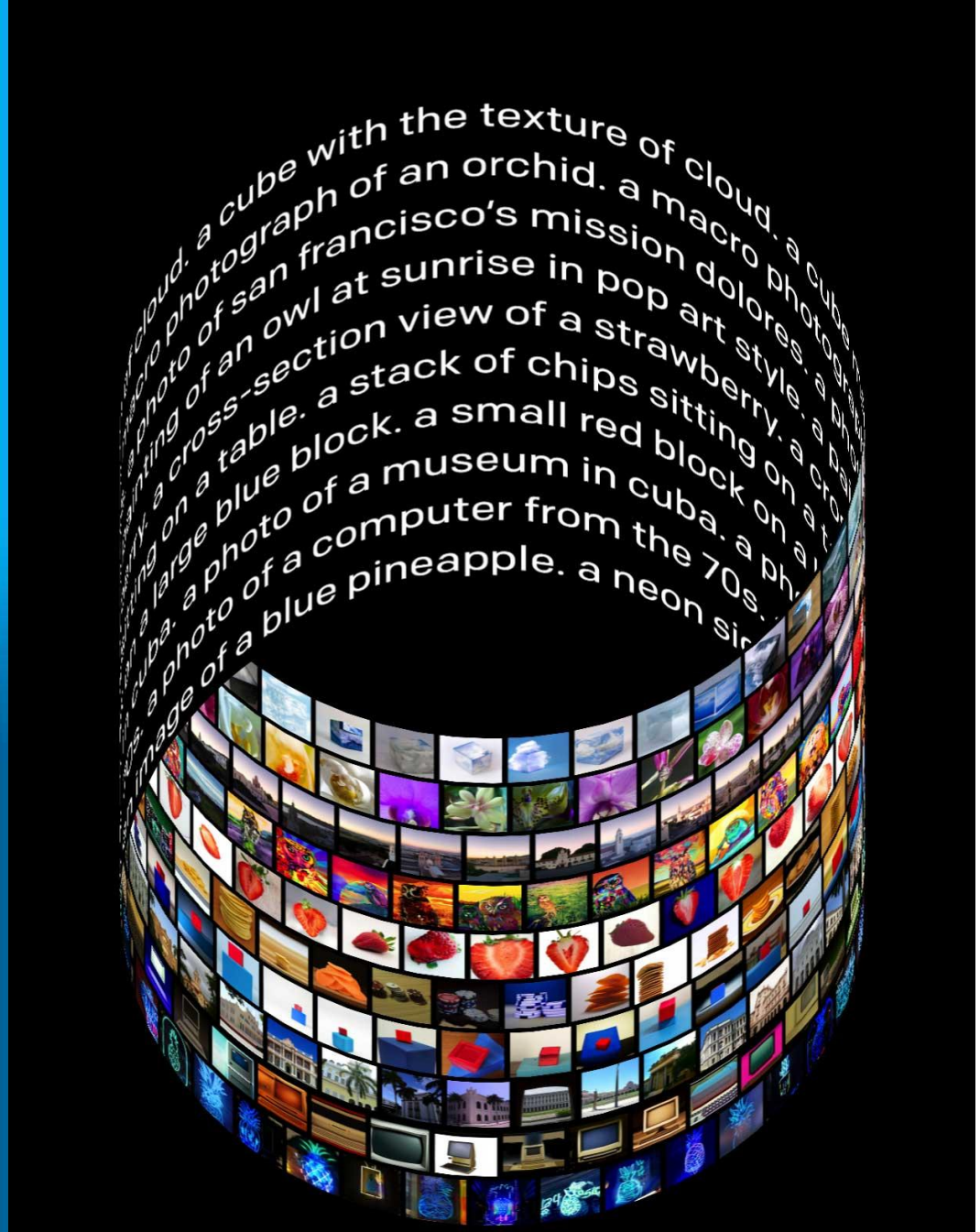

Source: https://openai.com/blog/dall-e/

Content generation has become a burgeoning area of development.

"Another trend is content generation: DALL-E can now generate images out of open AI. It makes some computational sense that we should be able to do it. When we think and have a text description, our brains generate an image even though we haven't seen it, like when we read a book and generate an image in our heads. The algorithms are capturing that ability, and it's remarkable. But with these content generation algorithms comes the potential for bias, and we have our work ahead of us in considering how they can and should be used."

-- Kristin Dana, Rutgers University, CVPR 2022 Program Chair

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There’s a reemergence of focus on classic computer vision.

“The community is at a unique junction where while some papers focus on core technical research combining classical and modern deep networks, others focus on classical problems and innovative solutions.”

-- Richa Singh, IIT Jodhpur, CVPR 2022 Program Chair

There’s a general movement toward synthetic data.

“There’s a tendency to move from real data to synthetic data if it is working, if it is effective. Cameras can only capture what has happened; whereas synthesis can imagine and produce whatever you wish. So, there is more variety in the synthetic data. And the privacy concerns are less.”

– Rama Chellappa, John Hopkins Univ., CVPR 2022 General Chair

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Facial recognition research continues to be the largest focus of biometric work.

“The Computer Vision, Pattern Recognition, and Machine Learning community at large is focusing on developing ingenious algorithms not only for difficult scenarios, unconstrained environments, but also being trustworthy and dependable."

-- Richa Singh, IIT Jodhpur, CVPR 2022 Program Chair

What the Future Holds

These trends summarize only a fraction of all that is occurring in computer vision today, and as baseball legend Yogi Berra famously said, “It's tough to make predictions, especially about the future.”

There’s so much more to come as relates to computer vision, and with such a rapidly evolving space, only the next round of research will tell us what’s next.

Stay connected with the Computer Society to see how the field continues to change and grow.

Stay abreast of the latest computer vision trends:

- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2023
- https://wacv2023.thecvf.com/home

- IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR) 2023
- https://cvpr2023.thecvf.com/