
VISUAL COMPUTING
The challenges getting machines to see

Jon Peddie Research

Focus and emphasis on Visualization, Graphics, and forms of reality

Consulting and market research - Advisor to industry leaders and investors

Bi-weekly report, various Digital Technology Market Studies

Product testing and benchmarking

Conferences

The Business of Multimedia and Visual Magic

Some Axioms to Live by:

In Computer Vision There is Never Enough

The Technology Works When its Invisible

Market Factoids

The total value of the machine vision market is expected to reach $9.50 Billion by 2020, at an estimated CAGR of 12.51% from 2014 to 2020. (Markets and Markets)

Shipments of embedded vision devices in the automotive, industrial automation, physical security and business intelligence markets are forecast to exceed 14 million units in 2018, up from almost four million units this year. IHS

Volvo will run pilot project with 100 self-driving cars on public roads from 2017 to 2020. Over the next six years, self-aware vehicles will autonomously sense, interpret, decide, act and communicate

Global video surveillance equipment revenue in 2014 is expected to rise to $15.0 billion, up from $13.5 billion in 2013.

You Can't Get Enough - in CV

Resolution

Response time

You Can't Get Enough - in CV

Resolution

Response time

Color differentiation

You Can't Get Enough - in CV

Resolution

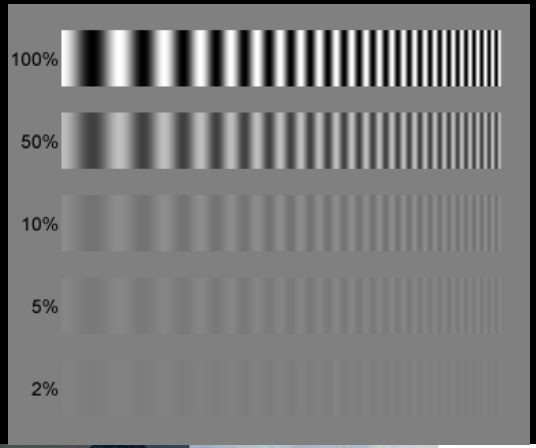
Response time

Color differentiation

Dynamic range

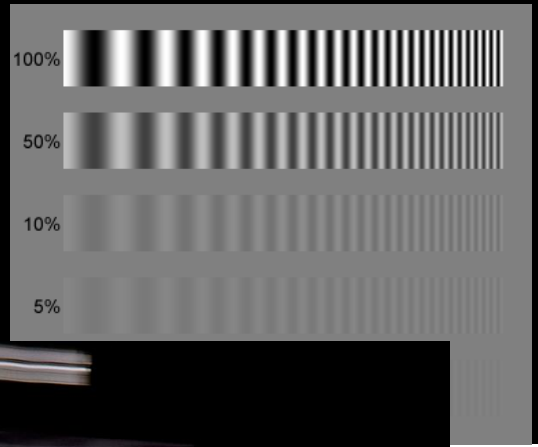
You Can't Get Enough - in CV

- Resolution
- Response time
- Color differentiation
- Dynamic range
- Contrast



You Can't Get Enough - in CV

- Resolution
- Response time
- Color differentiation
- Dynamic range
- Contrast
- Motion



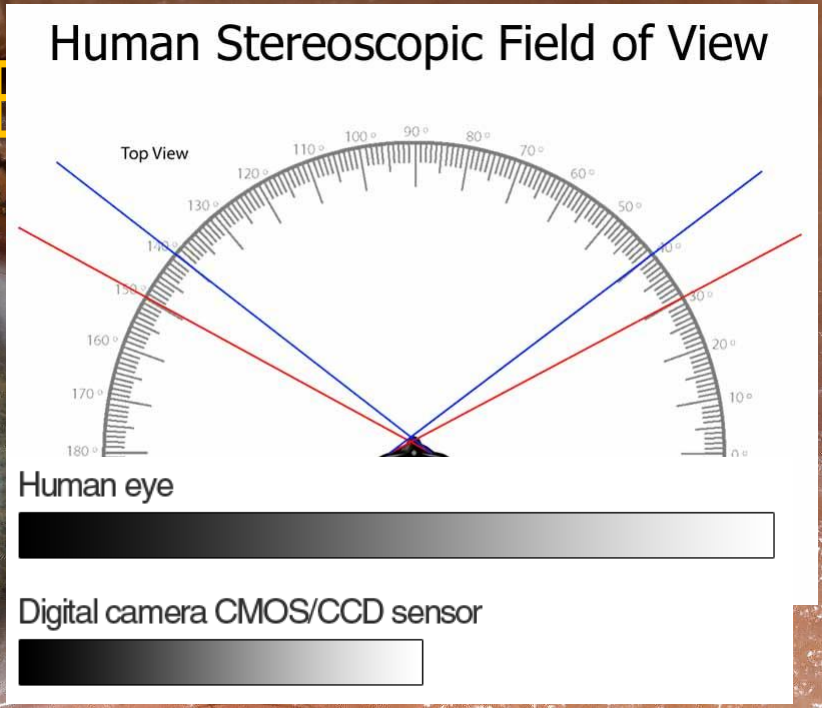
Why You Can't Get E

The competition is astounding

We can see a lot: The human eye field of view is 120-degree - as high as 170° horizontally

The human eye can detect a luminance range of 10^{14} - 100,000,000,000,000:1 (about 46.5 f-stops)

The human brain can make up for missing or incorrect image features.



Processing Power

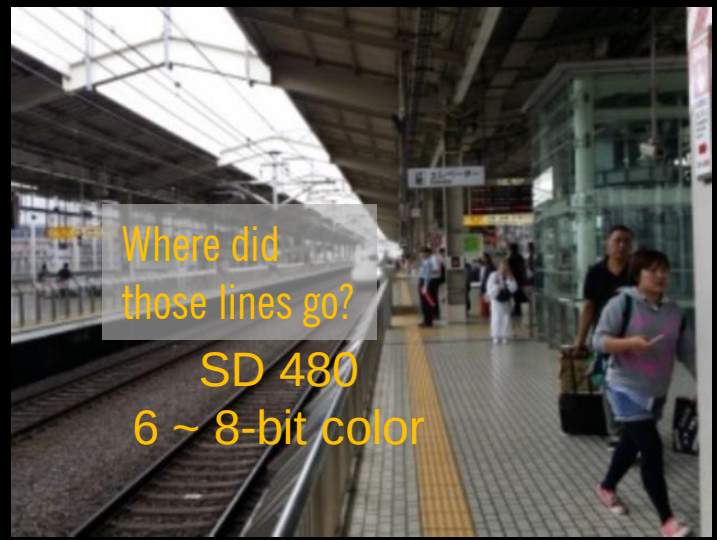
The human brain can process entire images that the eye sees for as little as 13 milliseconds

In Computer Vision There Is Never Enough

Why You Can't Get Enough - in CV

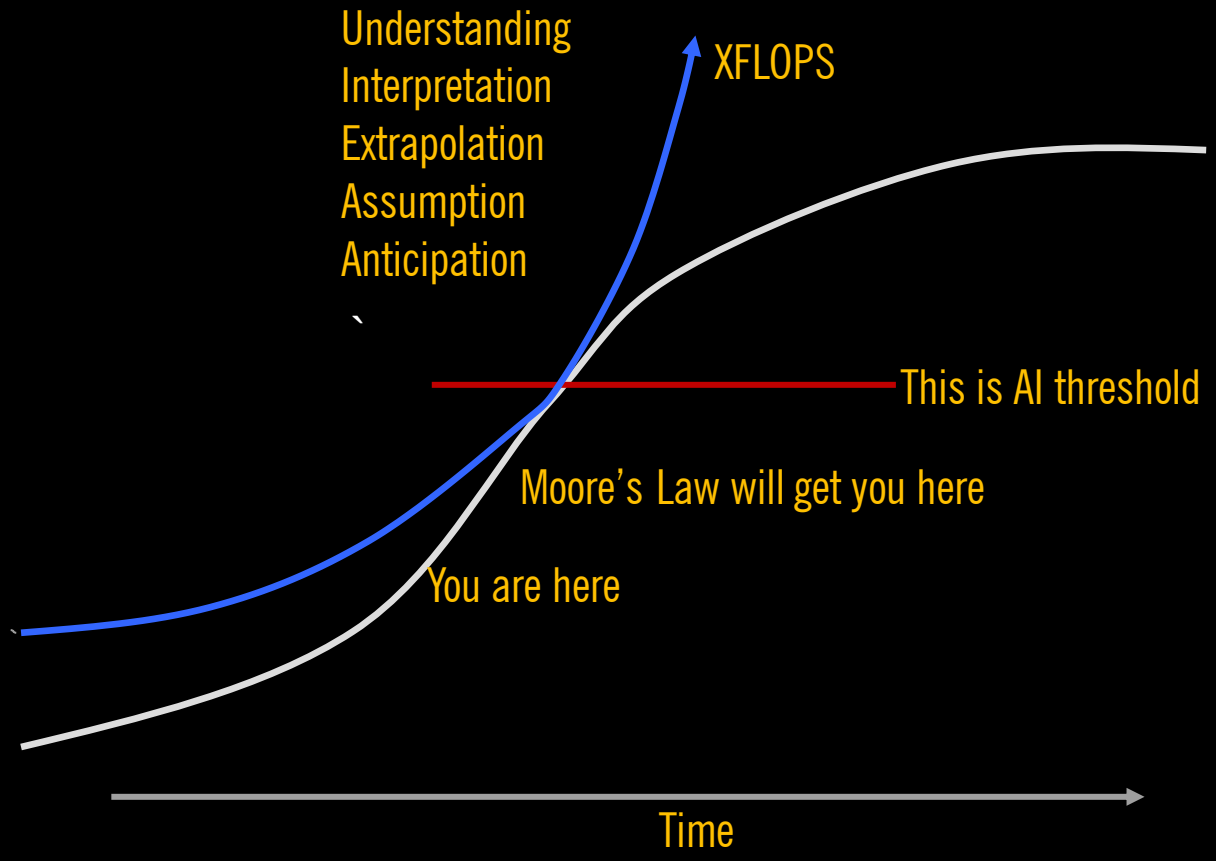
Recognition and identification
Pose estimation
Motion estimation and tracking
Feature extraction
Learning
Anticipation


エレベーター
Elevator
非常停止
ボタン
Emergency
train stop
button
SOS
Notice the
Straight
smooth lines
3840 x 2160 4K - UHD



You need
hi-res and
Significant
Pixel processing
To have a
Smart camera

Doing the Hard Stuff



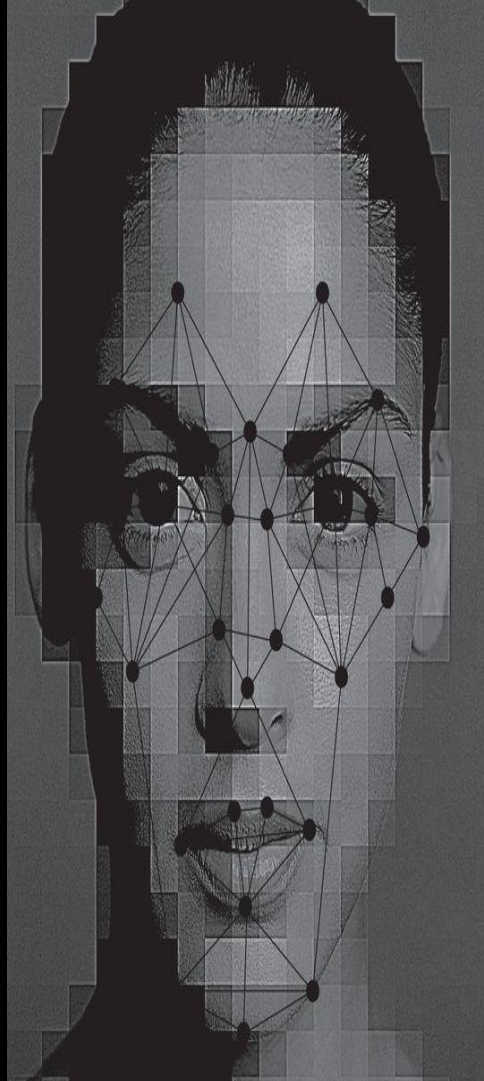
Knowing Who You Are

China will launch a facial recognition payment application with near-perfect accuracy for online transactions by just showing a picture of yourself

Chongqing Institute of Green has set up the world's biggest Asian face database displaying more than 50 million Chinese faces

The system scored the highest accuracy record of 97.6 percent

Chinese Academy of Science (CAS) will complete it in 2015



Computer Vision is Big Data

Using cloud-based data, Information visualization and visual data mining provide insight and understanding of unorganized data.

It needs, demands, security, fast data retrieval, analytics, and great displays
All the things GPUs are good at.

Visual Machine Learning

Discussed for decades, we are seeing the machine learning aspect of vision, acting closer and closer to the human brain, training the computer for specific vision task become a reality

Machine learning enables computers to automatically discover complex patterns in data and, and learn from the examples how to recognize occurrences of those patterns in new data.

Machine vision systems can improve production processes so the products produced are made at higher speeds, without defects

Deep – *DEEP*, learning techniques are being explored and exploited

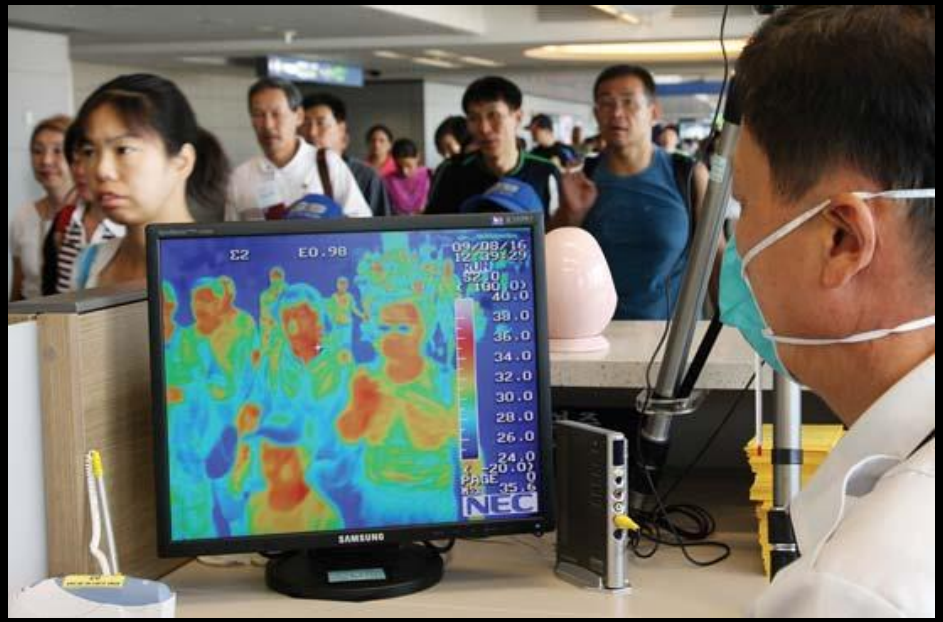
Who Wants it, Needs it?

Vehicles

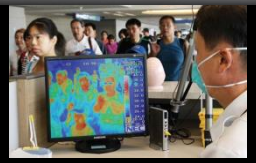
Who Wants it, Needs it?

Vehicles

Transportation terminals



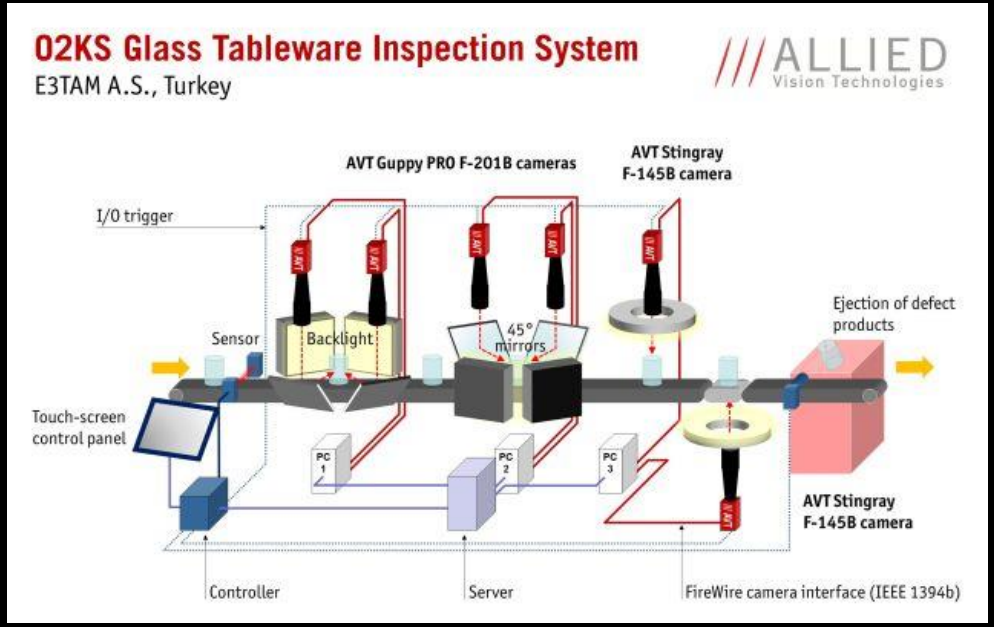
Who Wants it, Needs it?



Vehicles

Transportation terminals

Production lines



Who Wants it, Needs it?

- Vehicles
- Transportation terminals
- Production lines
- Mass and private transit
- Mobile devices
- Security
- Handicapped
- Entertainment
- Science & research

and . . .

Summary

There is an enormous demand for smart computer vision systems

The data analysis is gigantic and can't be done without the cloud

Smart cameras, with AI, and big reservoirs of data will anticipate and learn making life safer and more comfortable

Embedded Vision Alliance http://www.embedded-vision.com

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Chasing pixels – *finding Visual Magic*

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