THE FUTURE OF LIFE EVENT PREDICTION

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July 31, 2018

The origin of facial analytics merged with biodemography

The constancy and predictability of human longevity

Training computers to "see" like the human brain – machine learning brought to life

Practical applications of this new disruptive technology

What is hindering progress?

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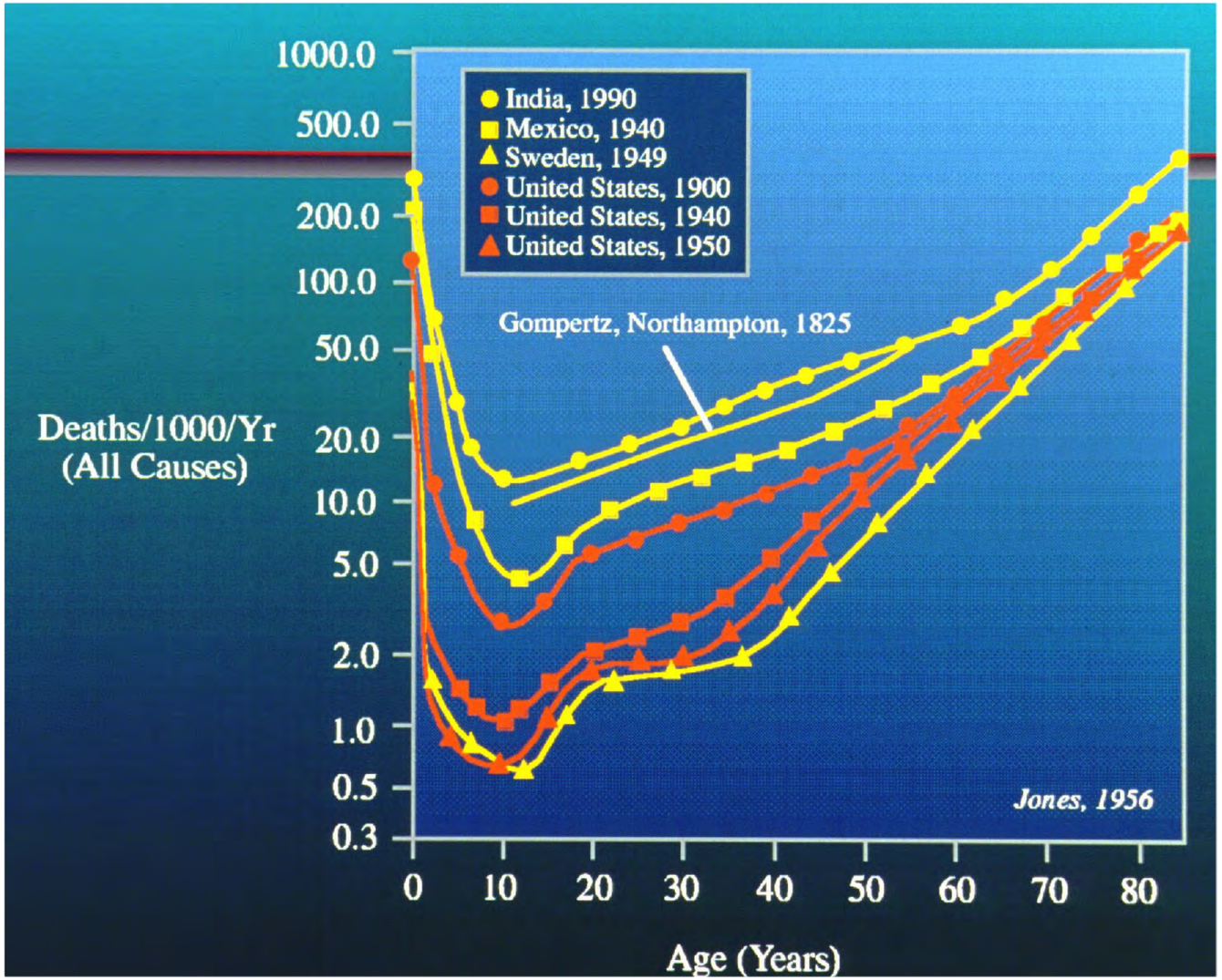
What is Biodemography?



- Length of life and timing of death in humans and other sexually reproducing species is a species-specific trait that is highly predictable because it is calibrated to elements of a fixed life history.
- Subgroup mortality is also highly predictable based on shared attributes.
- Insured populations are humans, and they're just another subgroup.

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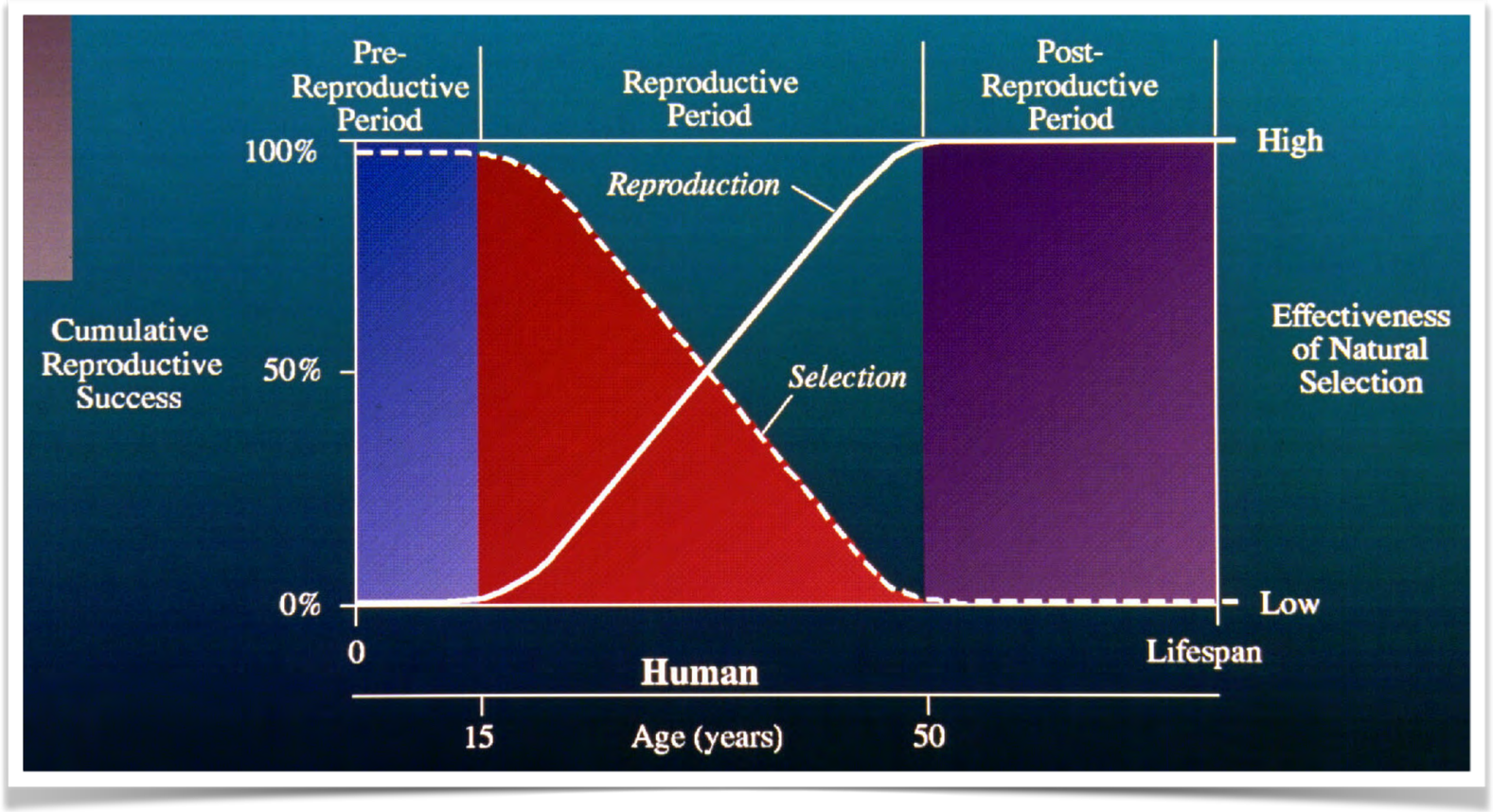

- There is a remarkable consistency to the timing of death across species.
- Duration of life is calibrated to the onset and length of a species' reproductive window.

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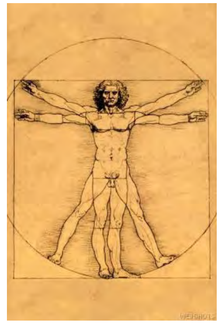
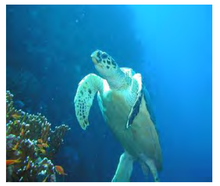
1,000 days
mouse

5,000 days dog

26,000 days
elephant



45,000 days
Human (max)
29,000 (avg)



55,000 days
sea turtle

77,000 days
bowhead
whale

146,000 days
Greenland shark

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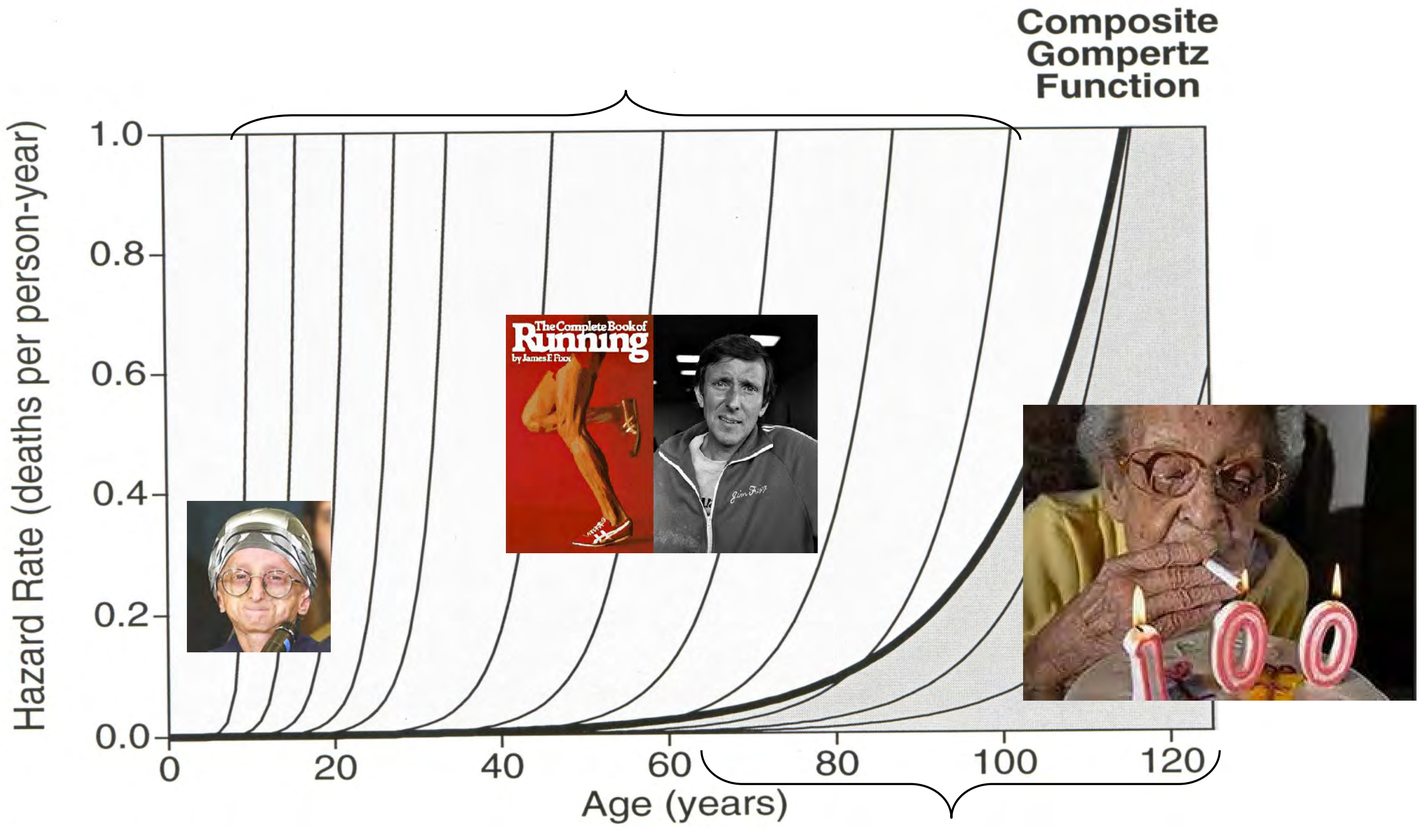
Populations Are Heterogeneous Mixtures



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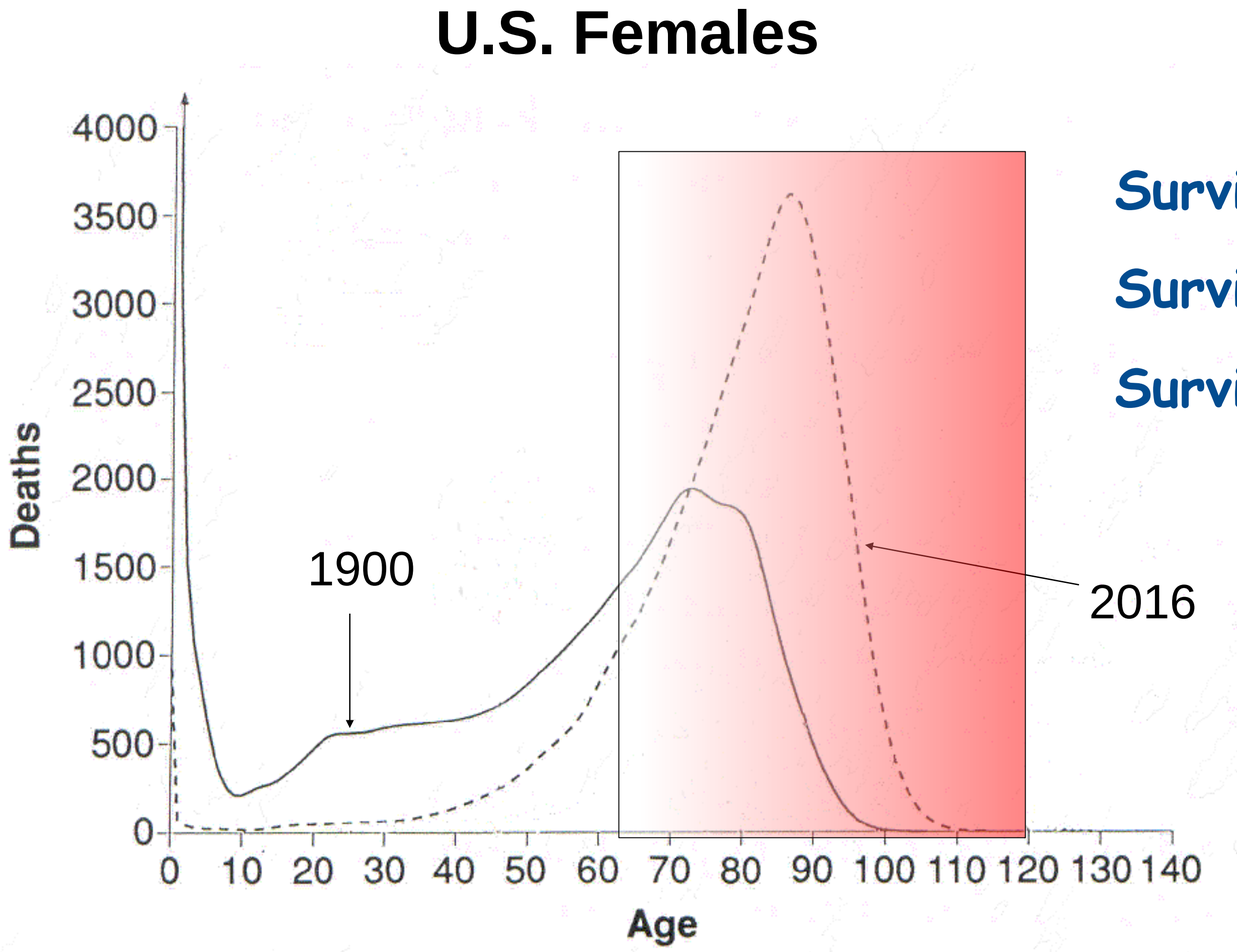
Most deaths in long-lived populations occur between ages 65-95



Survival 30-65 = 89.6%

Survival 40-65 = 90.4%

Survival 50-65 = 92.1%

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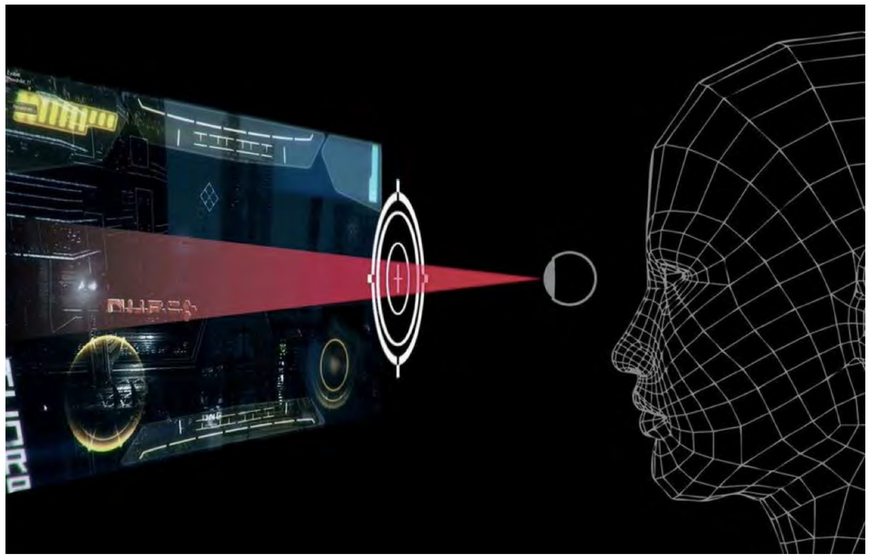
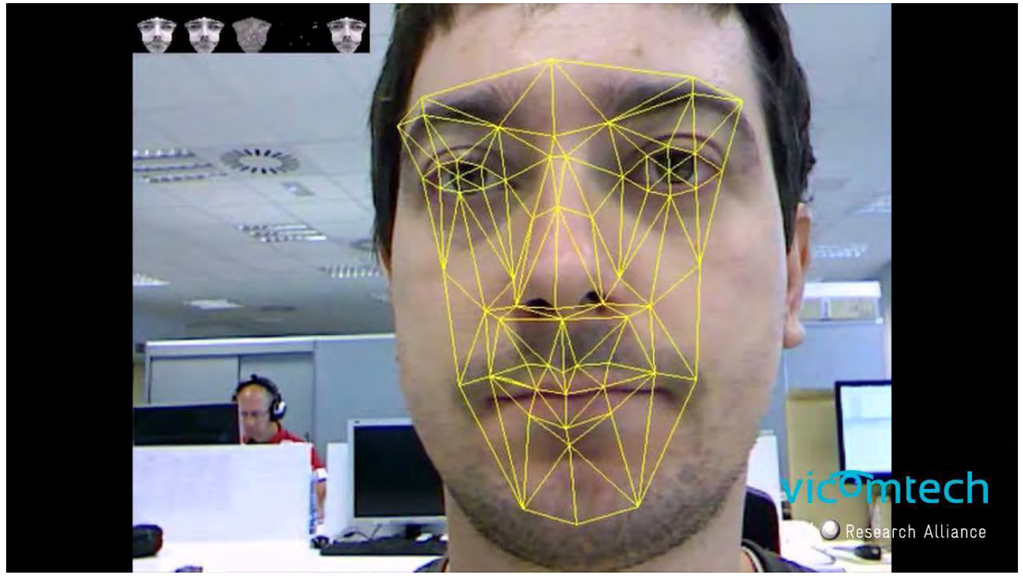
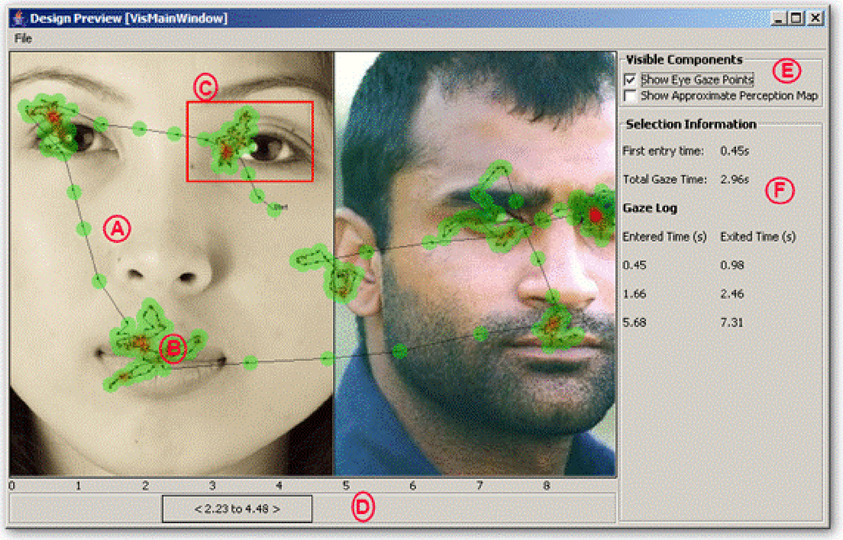
What is Facial Analytics?







- The face is a biomarker for rate of biological aging.
- Various diseases can be identified from the face, including some cancers and neurological conditions.
- We have the capacity to "teach" computers to think like humans, only faster and dispassionately.

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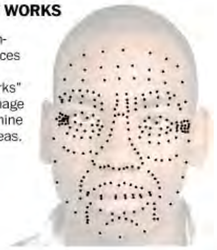
Can your face reveal how long you'll live? New technology may provide the answer.

By **Tara Bahrampour** July 2, 2014 Email the author

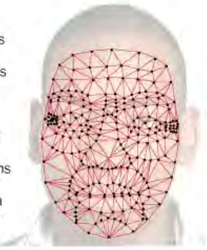
(Nicki DeMarco/The Washington Post)

HOW IT WORKS

1. A computer places 250 dot "landmarks" on the image to determine target areas.



2. It connects the dots to make triangles and looks for variations in color and texture within each triangle. More variations than average within an area often indicate an older face.



3. Six major regions are considered and assigned ages. The combination results in a "perceived age," which is basically how old the computer thinks the person behind the face is.

Note: Illustrations are schematic

WHAT THE COMPUTER SAW BY REGION

Tara Bahrampour
Bahrampour shows fewer signs of aging around her eyes and forehead than expected for her age, said Karl Ricanek, a scientist behind FaceMyAge.com. Genes play a huge role in the appearance of aging.

PERCEIVED AGE		PERCEIVED AGE
44.3 years Little creasing.	**Forehead** Horizontal creases and lines around the brow ridge are very common as skin loses elasticity.	**30.1 years** Two creases are just beginning.
48.9 Faint vertical lines.	**Brow region** Vertical lines appear between eyebrows in people who tend to furrow them. Lines and wrinkles are skin failing to spring back after the gymnastics that facial muscles perform.	**26.3** No lines.
52.3 No crow's feet, but some fine lines and puffiness.	**Area around eyes** Crow's feet and bags below eyes can begin to appear in the mid-20s. Shifting fat and loose skin can make brows and lids droop and eyes protrude, exposing lower lids.	**28.9** Eyes smooth and young "like those of a child," said Ricanek.
47.6 Freckles often become larger and denser, but Bahrampour's did not mislead the computer.	**Nose area** The tip of the nose becomes more bulbous with age. Skin texture changes, pores enlarge. Women in particular get "bunny lines" on the sides of their noses.	**26.4** The computer found no deep creases from the corner of the nose.
41.7 Small pores, no deep grooves.	**Cheeks/Jowls** Once-cherubic cheeks start to sag. Curved lines form around the mouth. Wrinkles develop in the cheeks.	**30.7** No drooping in his round cheeks.
51.5 Upper lip is thinner than the lower lip, and the corners of her mouth have begun to turn down.	**Mouth** Collagen declines, making lips thinner. Mouths begin to droop at the corners. Small, vertical lines form above lips, particularly in women.	**25.1** In a previous photo, dry lips and beard stubble made the computer judge this region to be 13 years older.
46.9 years 47 years, 2 months	**Computer perceived age** **Actual age**	**27.4 years** 29 years, 9 months

Robert Samuels
"Faces younger than 30 don't typically have a lot of interesting aging characteristics," Ricanek said. Samuels's face may show changes in a few years.

Face My Age
September 18, 2014 ·

http://www.perthnow.com.au/.../.../story-fnjgwr3x-1227061916153...

Youthful looks or ageing fast? Ingenious website tells you how old your face says you are

MOST of us are selfconscious about how old we look to others.

PERTHNOW.COM.AU

Check out the interview that was done this morning:
http://abc7chicago.com/.../the-story-behind-face-my-a.../238728/

Face My Age: Prof. Olshansky reveals story behind technology

Face My Age co-creator Professor S. Jay Olshansky revealed the original purpose of the technology that has the Internet buzzing.

son

s from Dr. Nir Barzilai

Bob Benmoche

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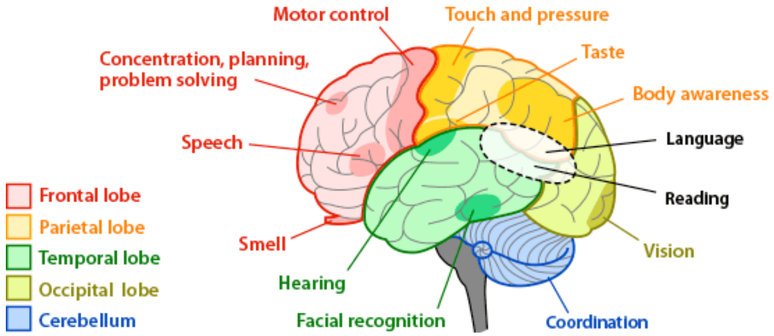
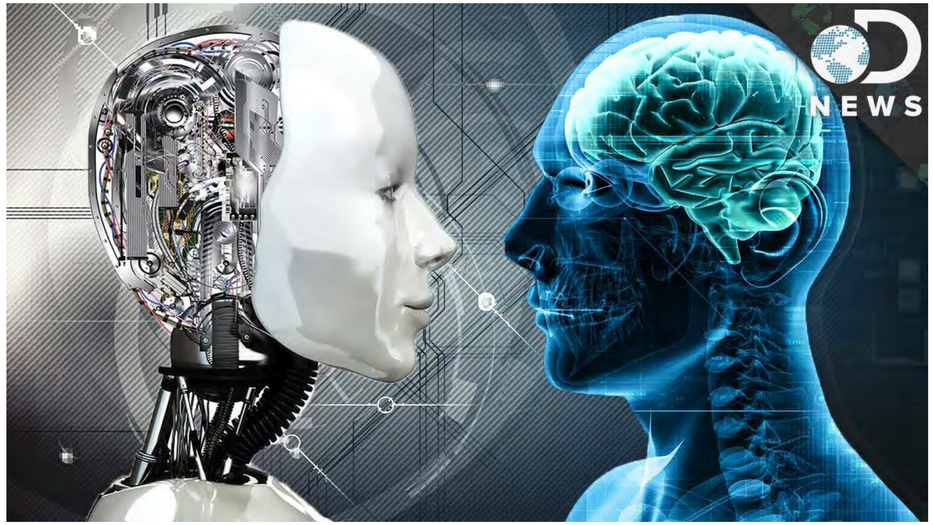


The human brain is hardwired to detect attributes of people. We use all of our senses in this process, and we're very good at it. The first point of contact is the face.

Lapetus has successfully trained computers to mimic the human brain's ability to detect these attributes.



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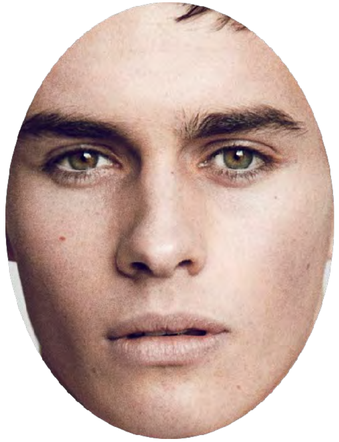
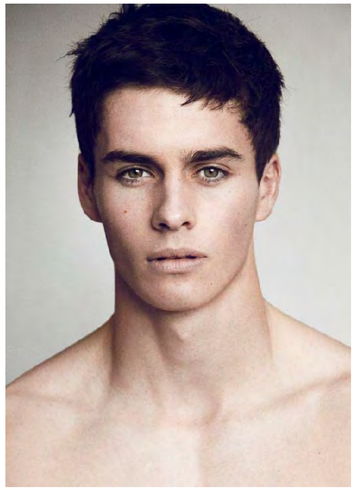
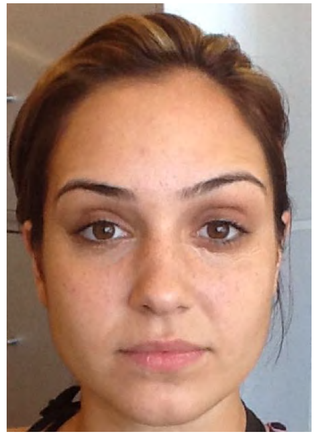
Gender Detection







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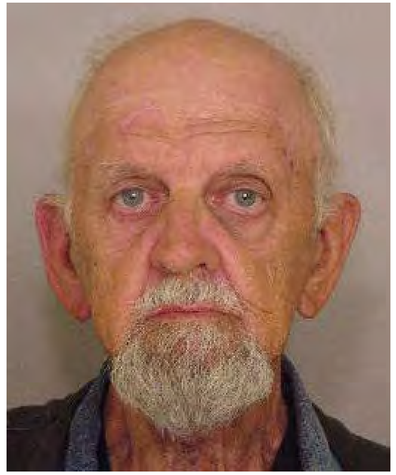
Age Detection

70



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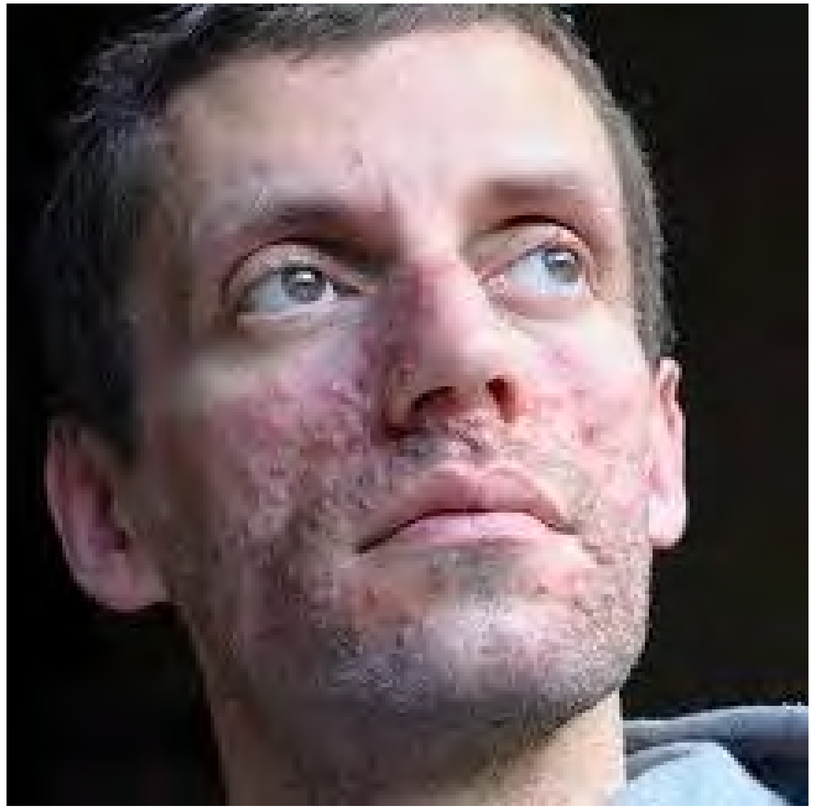
Health Detection



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BMI Detection

25.4

35.6

Intelligent BMI

30.8
/
25.3

35.6

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Smoking Detection

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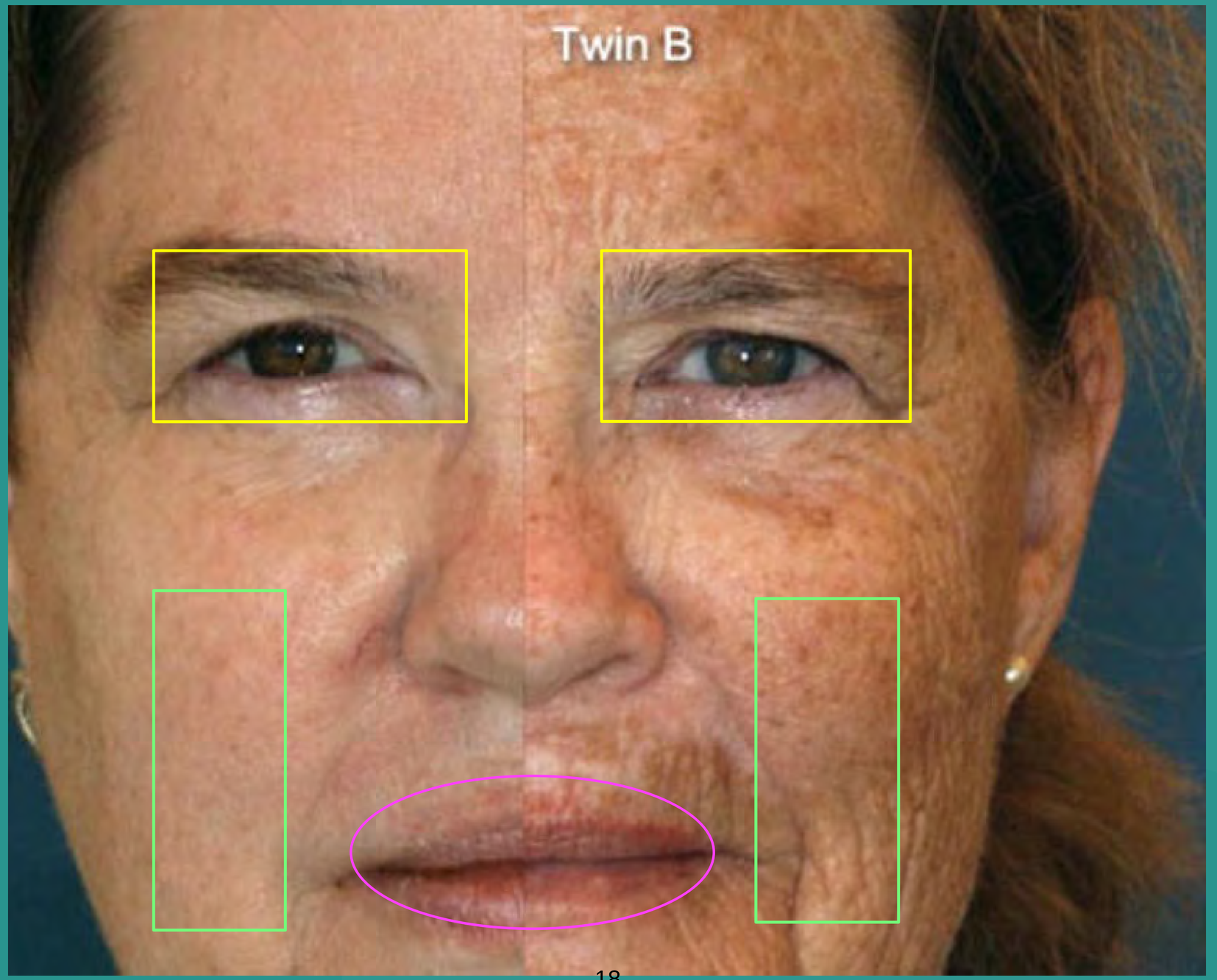

Twin B

Disease Detection

The Faces of Disease

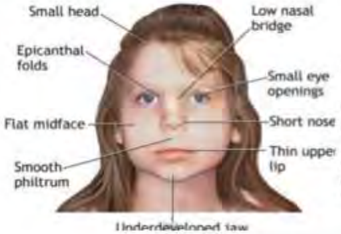
Amyloidosis
[linked to kidney and heart disease]

Diabetic rubeosis –
- A peculiar rosy reddening of the face, and sometimes of the hands and feet, may be seen in long-standing diabetes.
- The changes have been attributed to decreased vascular tone or diabetic microangiopathy

Diabetes

Lupus

HIV-associated Lipohypertrophy



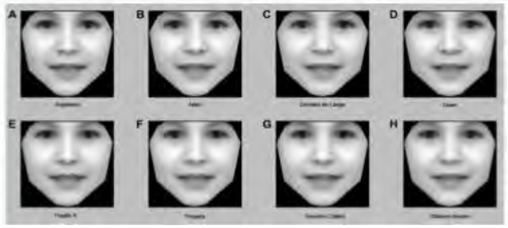
Fetal Alcohol Syndrome

Rare genetic disorders diagnosed by computer analysis of photos

Written by Marie-Ella

Published: Tuesday 24 June 2014

More and more, the medical world is being merged with technology to improve diagnosis, prevention and treatment of health conditions. Now, researchers from Oxford University in the UK have developed a computer algorithm that can analyze photographs and diagnose which children have a rare genetic disorder.



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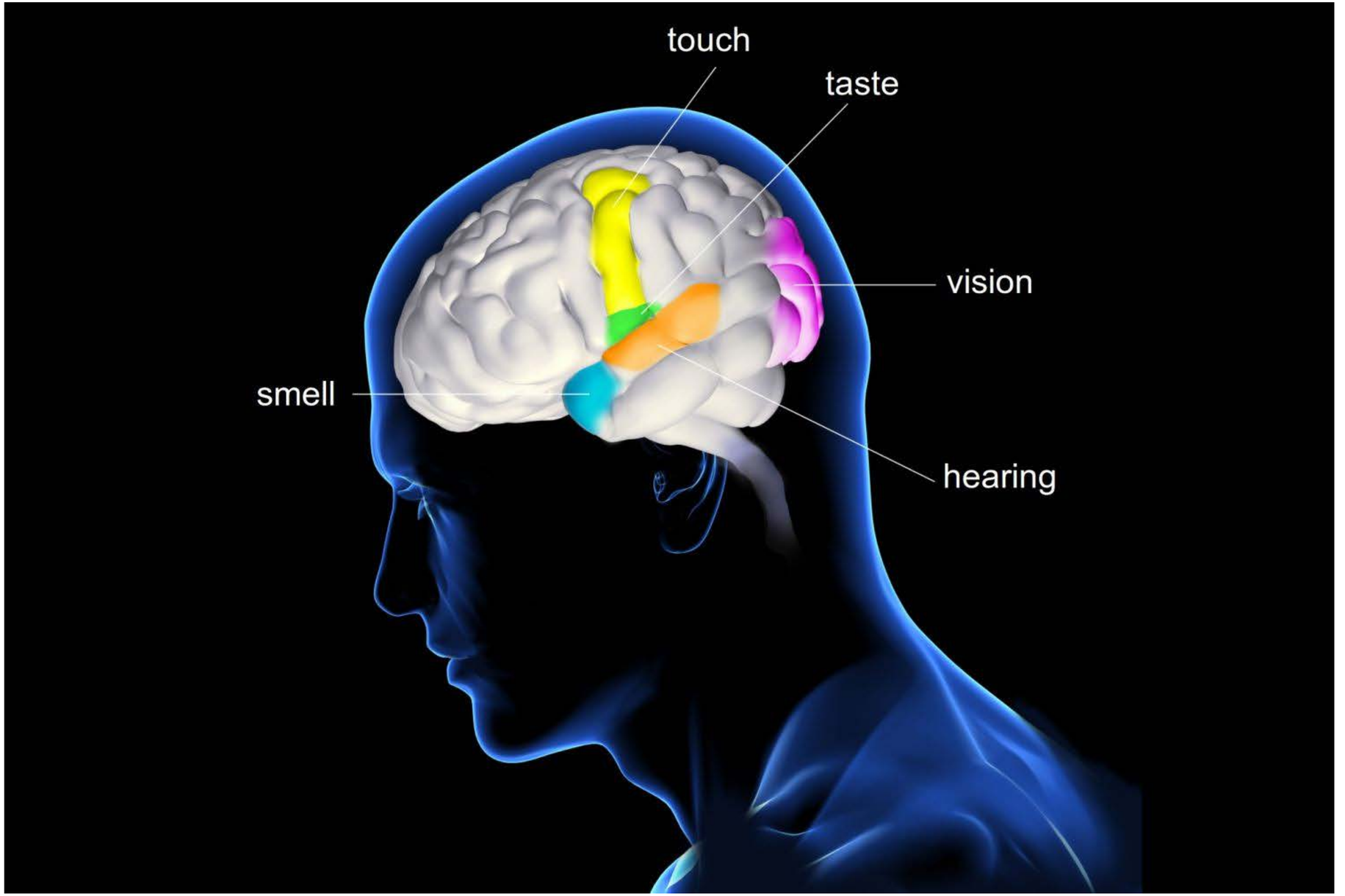

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Graves disease can be identified with a photograph of the eye. This is a byproduct of an overactive thyroid, and it appears in a photograph as bug eyes.

Source: http://www.nejm.org/doi/full/10.1056/NEJMra1510030

Arcus Senilis, characterized by a gray ring around the eye, is linked to high cholesterol and triglycerides, and an increased risk for heart disease and stroke.

Source:http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.741.4990&rep=rep1&type=pdf

Horner's Syndrome is characterized by a combination of droopy eyelids (ptosis) and pupils of a different size (aneisocoria). This condition is associated with aneurysms and tumors in the neck.

Source: http://www.atsjournals.org/doi/abs/10.1164/ajrccm-conference.2016.193.1_MeetingAbstracts.A3598

BMJ

BMJ 2012;345:e7396 doi: 10.1136/bmj.e7396 (Published 13 December 2012)

RESEARCH

CHRISTMAS 2012: RESEARCH

Using a dog's superior olfactory sensitivity to identify *Clostridium difficile* in stools and patients: proof of principle study

Cliff has been trained to sniff out the bacteria clostridium difficile

Results The dog's sensitivity and specificity for identifying *C difficile* in stool samples were both 100% (95% confidence interval 91% to 100%). During the detection rounds, the dog correctly identified 25 of the 30 cases (sensitivity 83%, 65% to 94%) and 265 of the 270 controls (specificity 98%, 95% to 99%).

Conclusion A trained dog was able to detect *C difficile* with high estimated sensitivity and specificity, both in stool samples and in hospital patients infected with *C difficile*.

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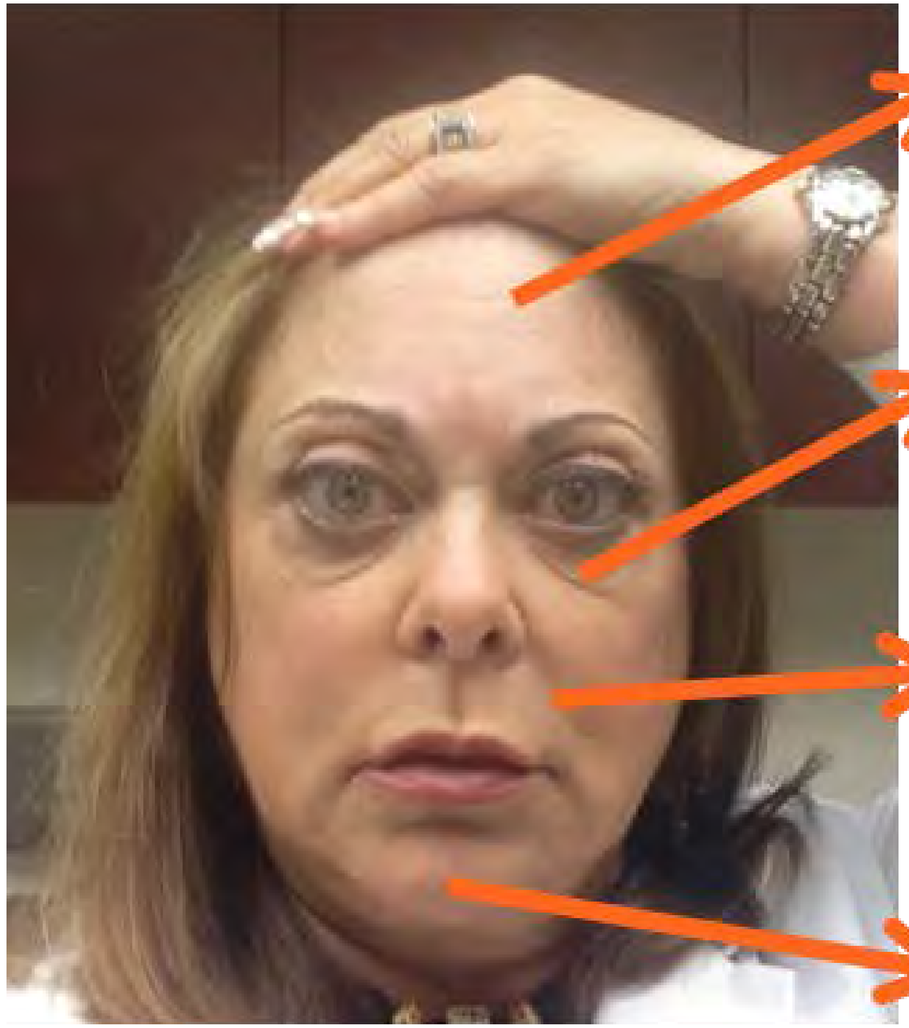
Accuracy rates improve with time as our sample size increases and more ground truth data become available to fine tune the algorithms.



Chronological age: 3-year range of error

Gender: near 100% accuracy

Smoking: 85% accurate

BMI: 79% accurate

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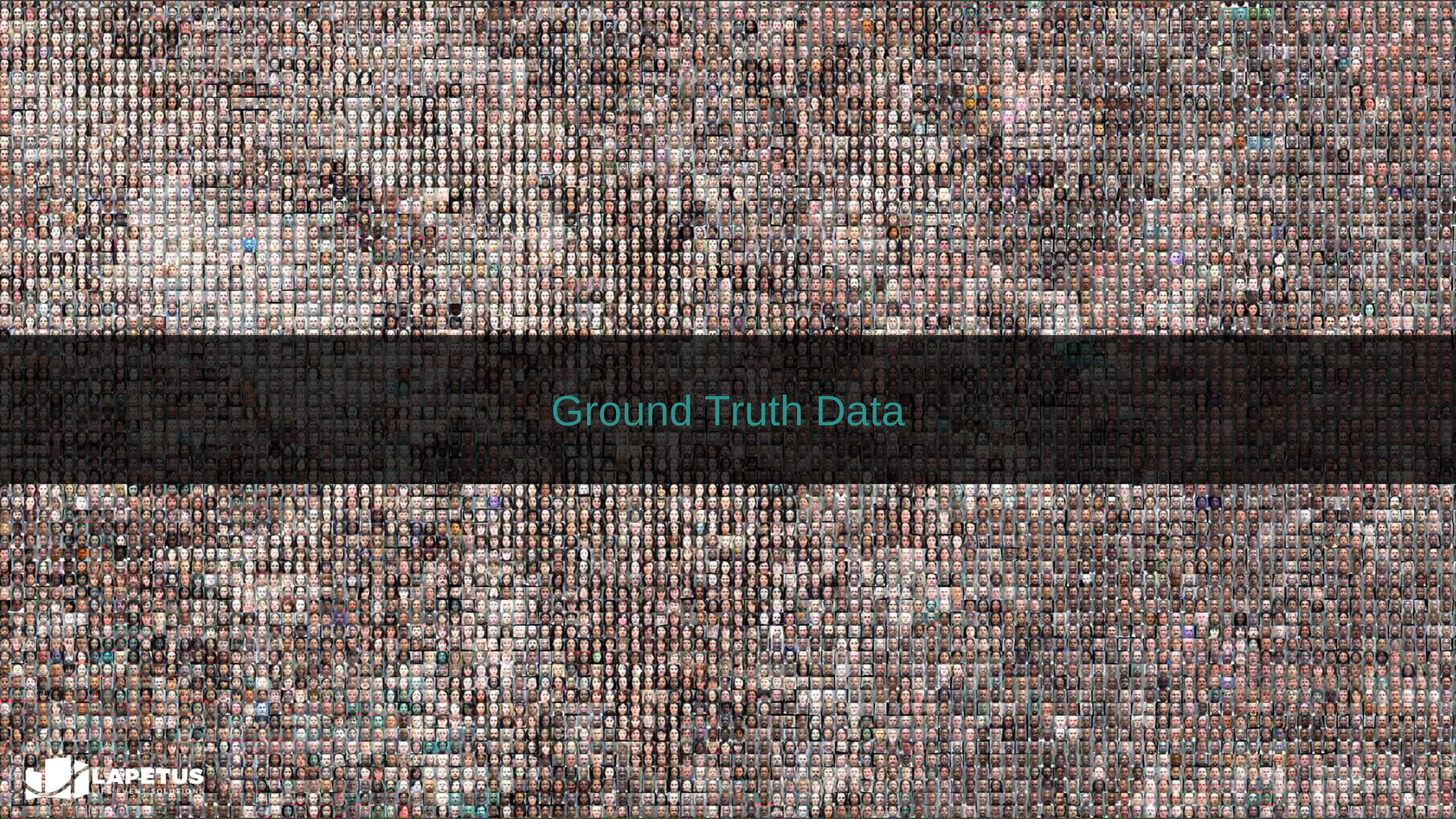
Ground Truth Data

SMILe

SMOKER INDICATION AND LIFESTYLE ESTIMATION

- ✓ Consumer signs release form
- ✓ Completes a detailed health questionnaire
- ✓ We capture multiple photos- various poses and expressions
- ✓ We also capture video and voice recording

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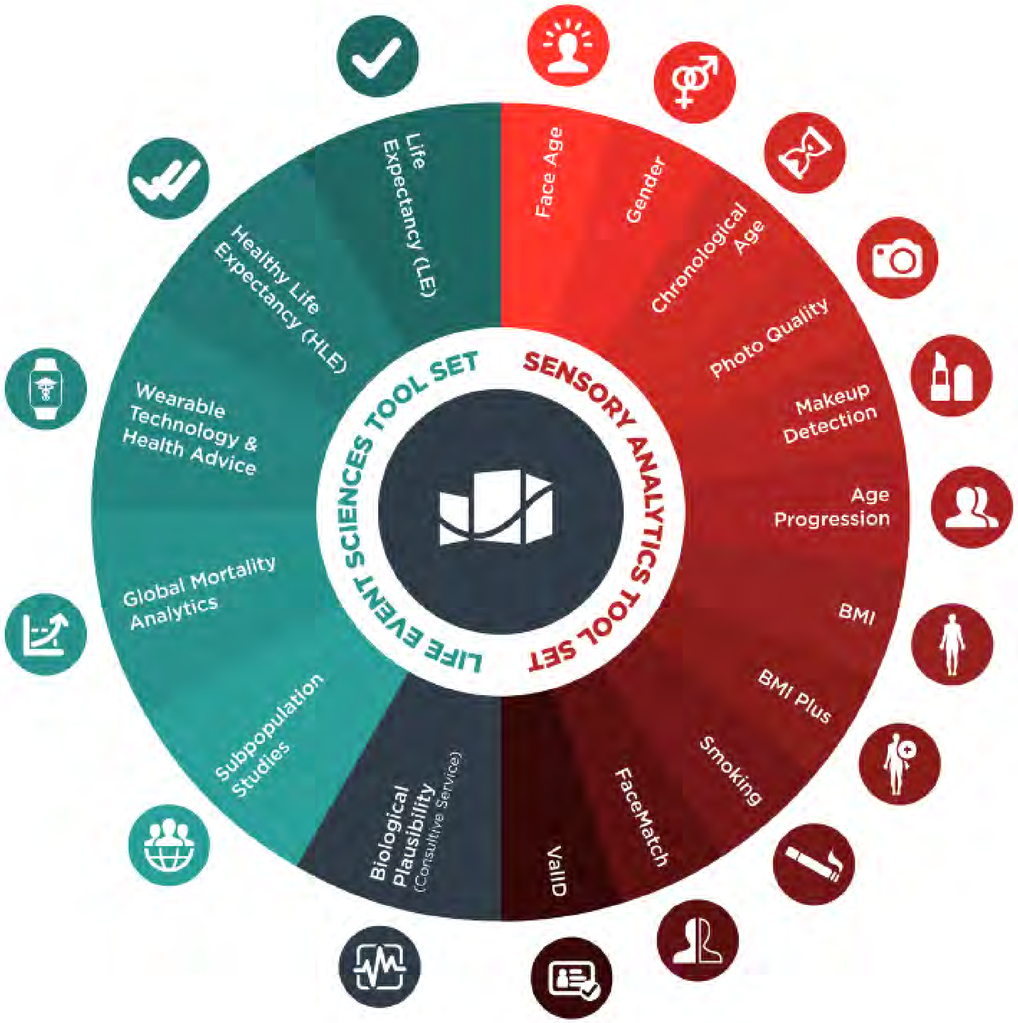
SMILE
SMOKER INDICATION AND LIFESTYLE ESTIMATION

We currently offer the following **Life Sciences and Sensory Analytics tools**. Rollover the icons for descriptions of each tool and its function.



New tools are always in development. **Sign up for Metis Flash** to receive our latest updates and enhancements in a quick, easy-to-read format.

CHRONOS

Changing the face of insurance underwriting

See how we've transformed a complicated, invasive and time consuming process into a fast, easy-to-operate solution.

HealthE

Personalized Health Advice

Our Life Sciences-based platform provides customized advice to help people live longer, healthier lives.

Read more »

BLISS

BETTER LIFE AND INCOME SCORING SYSTEM

Life Event Planning. Reinvented.

Our breakthrough platform considers an individual's health, longevity and wellbeing in addition to wealth.

JANUS

Engaging Customers One Selfie at A Time

Today's mobile-enabled generation demands faster, more-relatable ways to interact with insurers.

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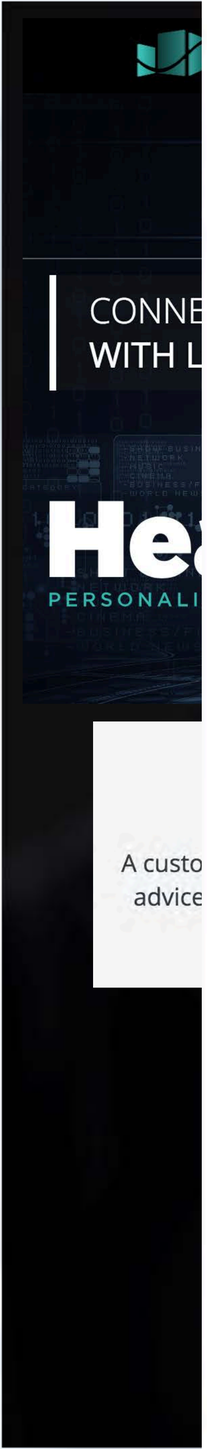
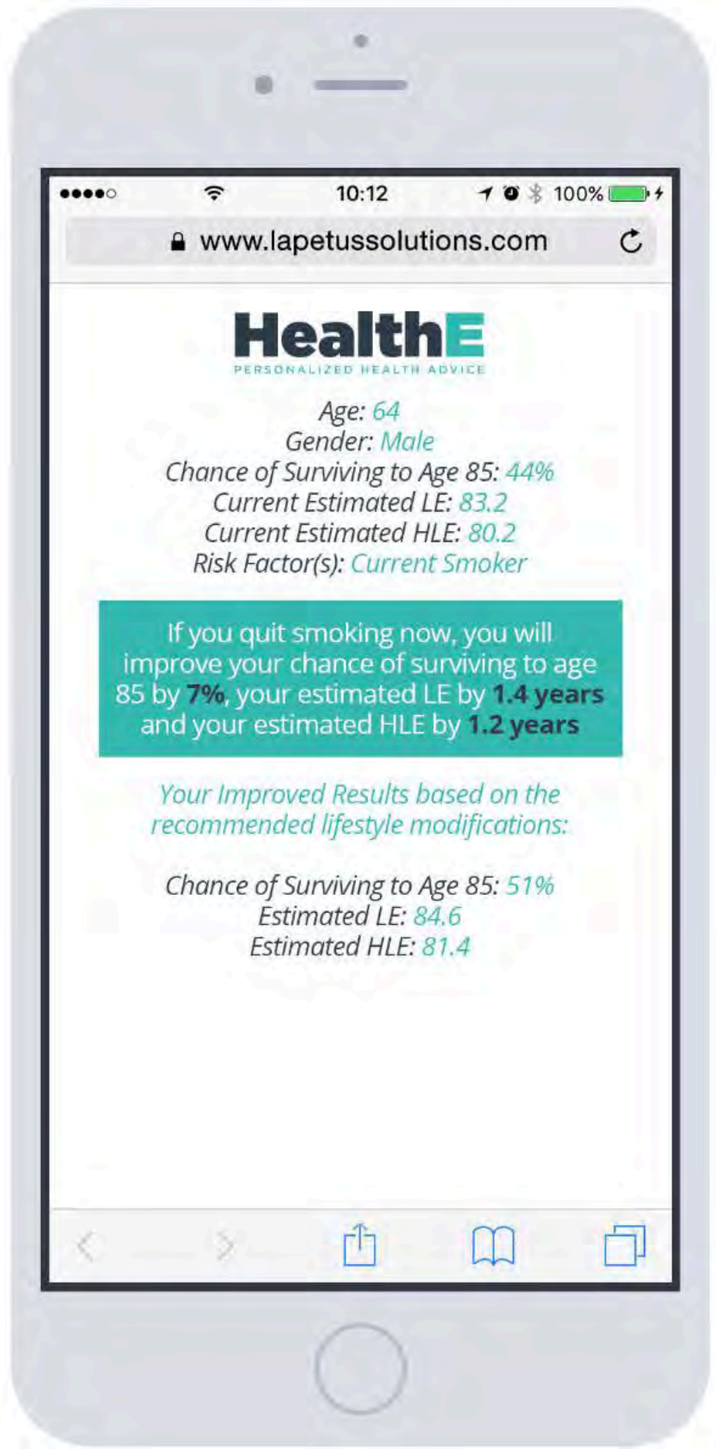
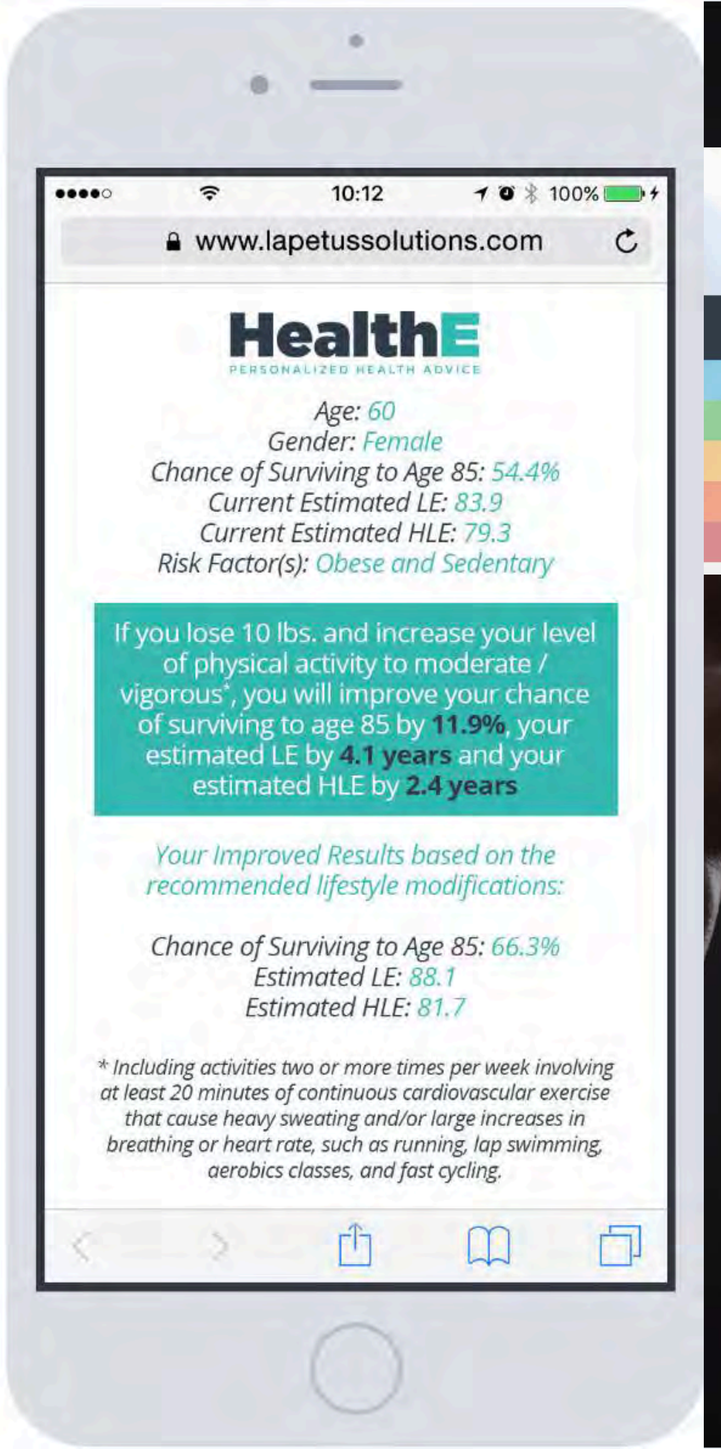
ONLINE ID VERIFICATION AND INSURANCE APPLICATION PROCESSES HAVE JUST BEEN EMPOWERED

Introducing our Identity Management Tools

VALID FACEMATCH

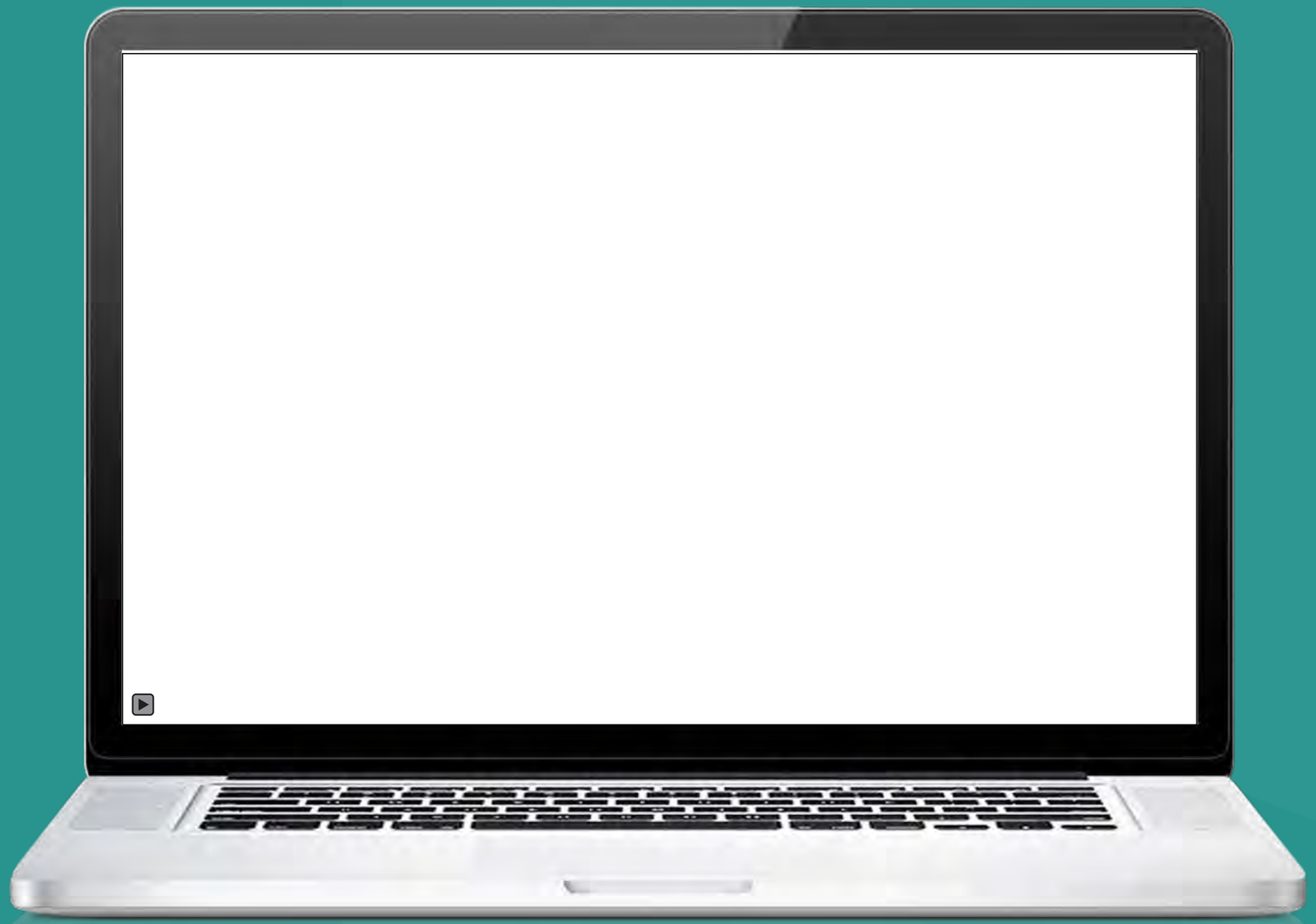



10:12
100%
www.lapetussolutions.com
HealthE
PERSONALIZED HEALTH ADVICE
Age: 64
Gender: Male
Chance of Surviving to Age 85: 44%
Current Estimated LE: 83.2
Current Estimated HLE: 80.2
Risk Factor(s): Current Smoker
If you quit smoking now, you will improve your chance of surviving to age 85 by 7%, your estimated LE by 1.4 years and your estimated HLE by 1.2 years
Your Improved Results based on the recommended lifestyle modifications:
Chance of Surviving to Age 85: 51%
Estimated LE: 84.6
Estimated HLE: 81.4


10:12
100%
www.lapetussolutions.com
HealthE
PERSONALIZED HEALTH ADVICE
Age: 60
Gender: Female
Chance of Surviving to Age 85: 54.4%
Current Estimated LE: 83.9
Current Estimated HLE: 79.3
Risk Factor(s): Obese and Sedentary
If you lose 10 lbs. and increase your level of physical activity to moderate / vigorous*, you will improve your chance of surviving to age 85 by 11.9%, your estimated LE by 4.1 years and your estimated HLE by 2.4 years
Your Improved Results based on the recommended lifestyle modifications:
Chance of Surviving to Age 85: 66.3%
Estimated LE: 88.1
Estimated HLE: 81.7
* Including activities two or more times per week involving at least 20 minutes of continuous cardiovascular exercise that cause heavy sweating and/or large increases in breathing or heart rate, such as running, lap swimming, aerobics classes, and fast cycling.


SLEEP
7 Hours
< 7 Hours
> 7 Hours

CHRONOS



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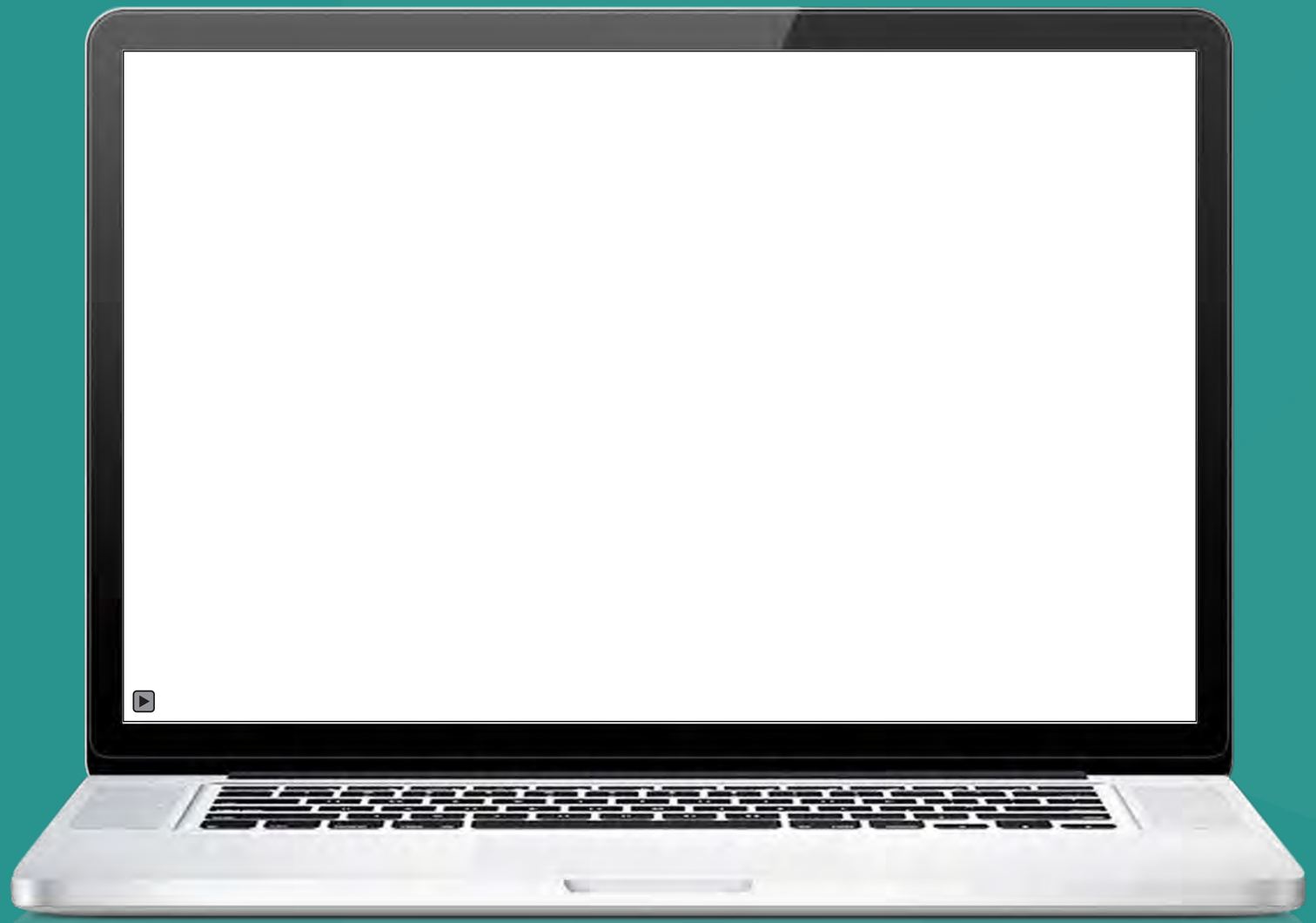
Live Market Example



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