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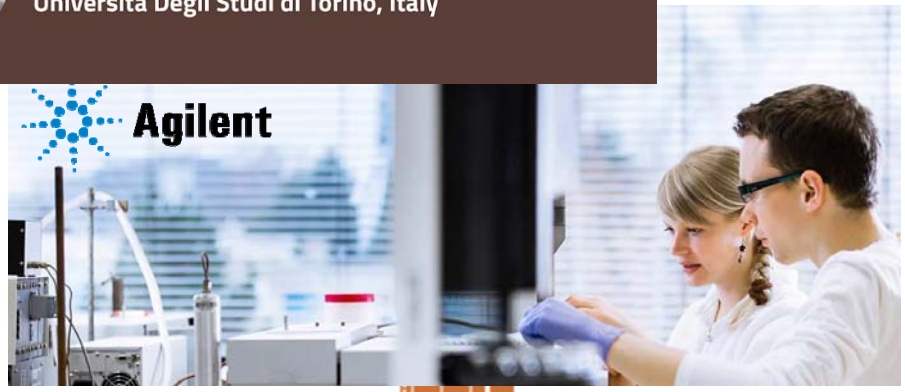
Analytical Chemistry
Food composition
Fingerprint analysis
AI smelling



Is Artificial Intelligence and machine learning going to be in charge of our food system?

https://orcid.org/ 0000-0003-3201-0775

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nature machine intelligence
ARTICLES
https://doi.org/10.1038/s42256-020-0159-4
Check for updates

Rapid online learning and robust recall in a neuromorphic olfactory circuit

Nabil Imam[1] and Thomas A. Cleland[2]

Our noses are busy beasts.
At any given moment, multiple smells are competing for our attention, and somehow the brain can tell when it's smelling an orange even against a backdrop of other scents, say perfume or soap.

The brain's olfactory bulb has hundreds of receptors tracking odors all the time, and yet somehow keeps everything straight.
Scientists at Cornell University working with researchers at Intel have just created an AI algorithm trained to recognize 10 scents by mimicking the mammalian olfactory bulb (MOB).
Give the algorithm a computer chip to run on and it can learn to identify new odors.[1]

[1] https://bigthink.com/

Artificial Intelligence smelling
has to be considered a reality ...

Analytical Chemistry
can answers (many questions)...

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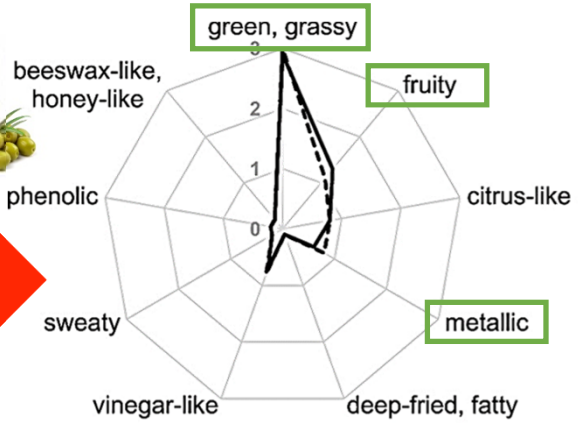
Artificial Intelligence *Smelling*[1]

Context: *Sensomics*[2]

Principle: odorants patterns evoke specific smells and aroma qualities - identity

Methods: **extract**, **isolate**, **quantify** odorants by reliable and robust methodologies

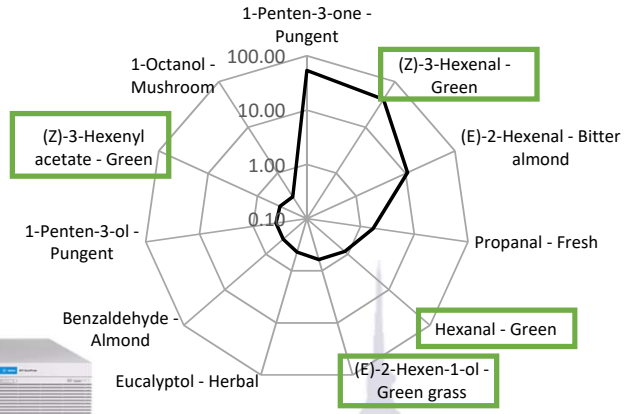
Outcome: *Sensomics*-Based Expert System[2] that **predicts key-aroma signatures** of food **without** using **human olfaction**



Human panel

https://www.solagrifood.com

Analytical system



1. Dunkel, A.; Steinhaus, M.; Kotthoff, M.; Nowak, B.; Krautwurst, D.; Schieberle, P.; Hofmann, T. Angew. Chemie - Int. Ed. 53 (28) (2014) 7124–7143.
2. Nicolotti, L.; Mall, V.; Schieberle, P. J. Agric. Food Chem., 67 (2019) 4011–4022

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Artificial Intelligence *Smelling*

Sensomics-Based Expert System that **predicts key-aroma signatures** of food **without** using **human olfaction**

and much more...

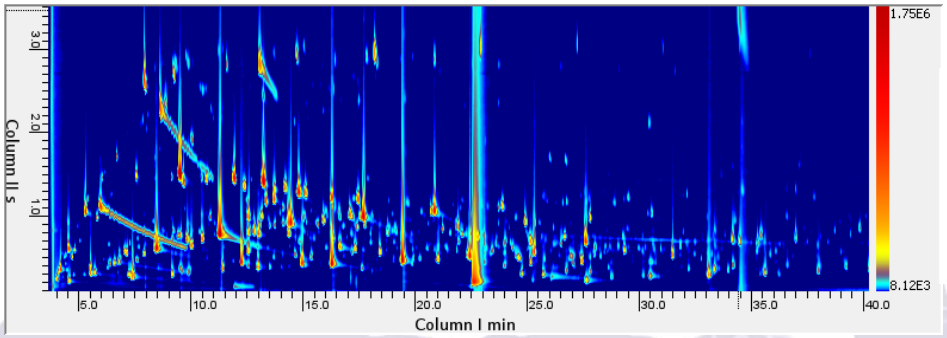
Analytical Chemistry can answer (many questions)

modern omics strategies combining many different analytical dimensions realize high-information density measurements

~~Targeted analysis~~
~~Profiling~~

Untargeted analysis
Fingerprinting

Contour plot of the total volatilome of an extra-virgin olive oil analyzed by comprehensive two-dimensional gas chromatography coupled to mass spectrometry. Single analyte resolution fingerprint and highest specificity due to molecular-level identification.



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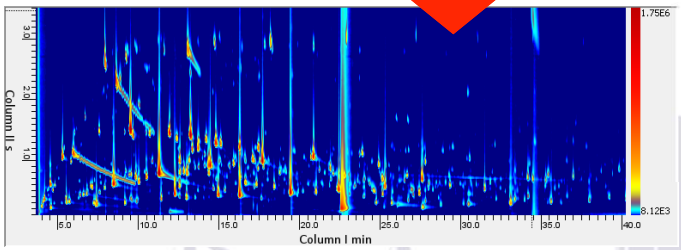
Artificial Intelligence *Smelling*

Sensomics-Based Expert System that **predicts key-aroma signatures** of food **without** using **human olfaction**

and much more...

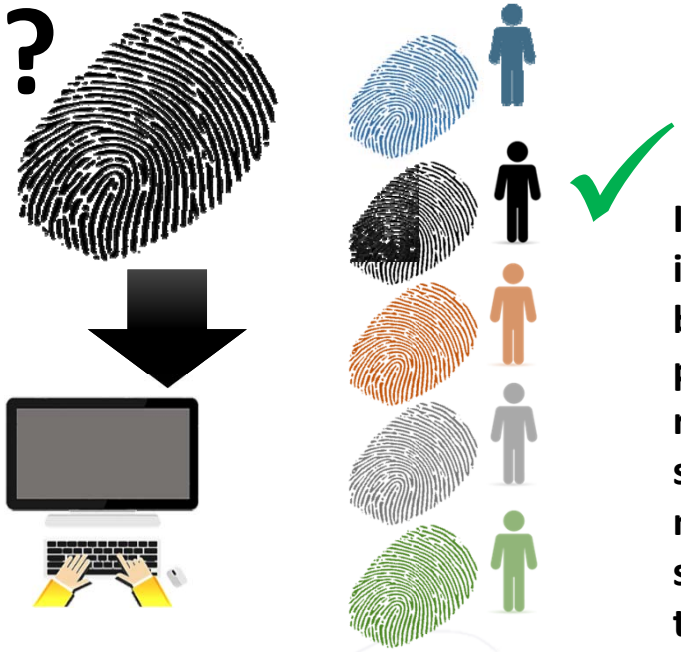
3D Sample fingerprint



Human fingertips

Biometric fingerprinting - *minutiae* features

Cross-comparative analysis



Identification of individuals based on pattern recognition and similarity matching with stored templates

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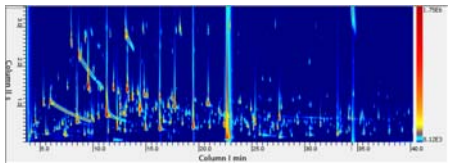
Multidimensional analysis
3D sample fingerprint



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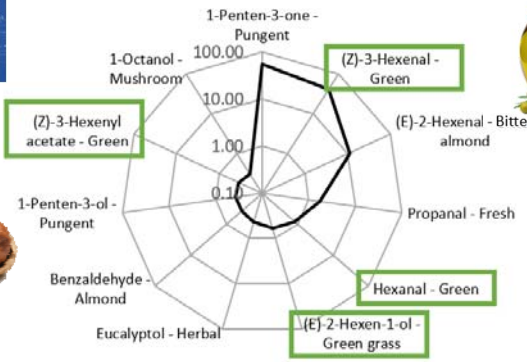
Artificial Intelligence *Smelling*

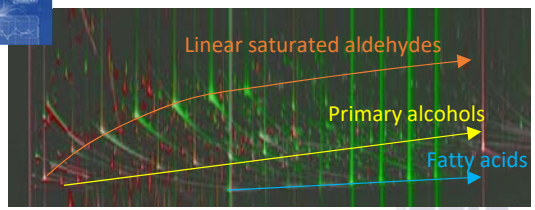


Origin traceability - *Identitation*

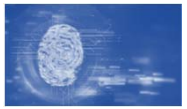
High-quality cocoa - Benckmarking

Volatiles patterns are origin and process specific. They can be used for diagnostic purposes to develop blends of origins while achieving a desirable standard.

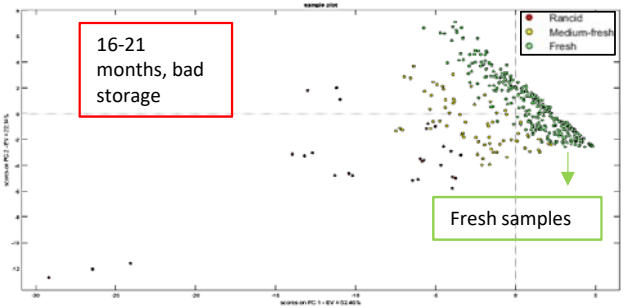
Spoilage detection - Computer Vision



Shelf-life quality evolution - Decision makers



30 Robust markers
450 samples
Decision makers for industrial storage strategies



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Comprehensive Analysis
Quality Control and Quality Assurance

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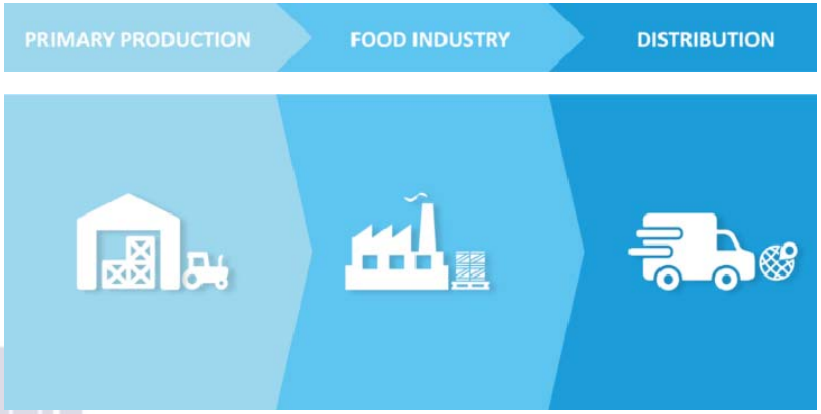
Agilent

Artificial Intelligence and Machine Learning enable a step forward from Fingerprinting to Higher Level Information and Knowledge

AI *Smelling*

Computer *Vision*



Identitation

Fingerprinting

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