Odor Sensing Techniques as a tool for Biometric Person Authentication: An Explorative Approach

Yousif Albastaki

MIS Department

Ahlia University

Biometric authentication
&
Biometric identification

Biometric authentication

Is the process of comparing data for the person's characteristics to that person's biometric "template" in order to determine resemblance.

Biometric identification

consists of determining the identity of a person. The aim is to capture an item of biometric data from this person.
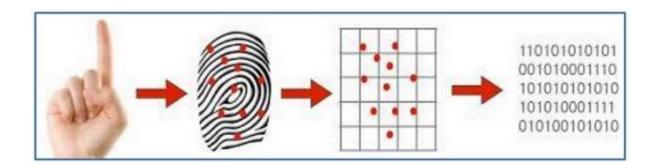
Current Biometrics & Identification Methods

- *Fingerprint*
- *Iris Recognition*
- *Facial Scanning*
- *Hand geometry*
- *Voice Biometry*
- *Keystroke dynamic*
- *Signature Verification*
- *Vein Matching*
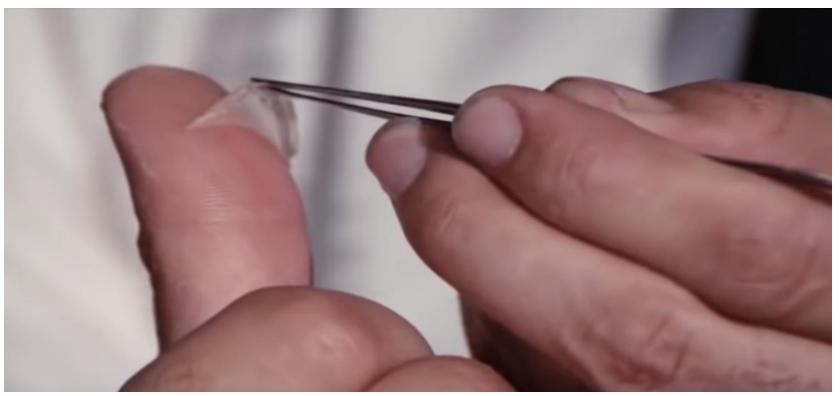- *Gait Identification*
- *Others ?*

Fingerprint Verification Method

❑ The oldest forms of biometric techniques
❑ Involves mapping of the pattern of the fingerprint of the individual
❑ Then comparing the ridges,
❑ furrows, within the template.
❑ The fingerprint given to the device is first searched at the coarse level in the database
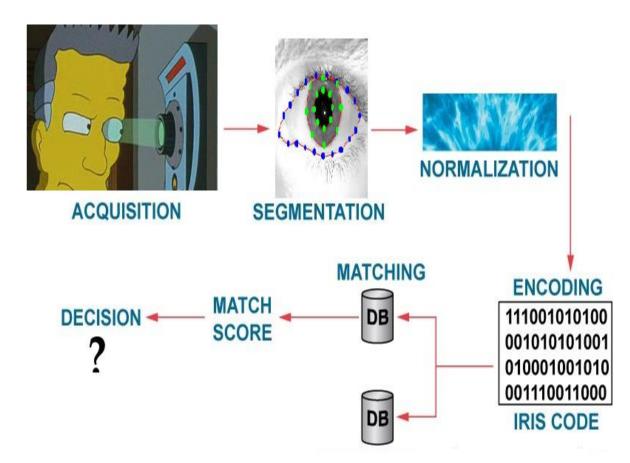❑ Finally the finer comparisons are made to get the result.

Can Fingerprints Be Faked?
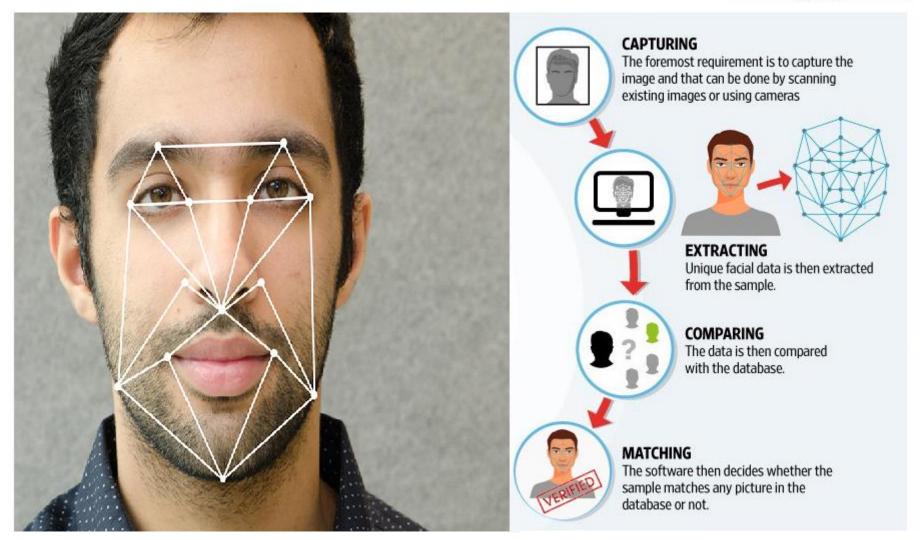
Iris Recognition Method

- ❑ The iris and the retina are scanned by a low intensity light source
- ❑ The image is compared with the stored patterns in the database template.
- ❑ This is one of the fastest forms of biometry

Facial Scanning

CAPTURING
The foremost requirement is to capture the image and that can be done by scanning existing images or using cameras

EXTRACTING
Unique facial data is then extracted from the sample.

COMPARING
The data is then compared with the database.

MATCHING
The software then decides whether the sample matches any picture in the database or not.
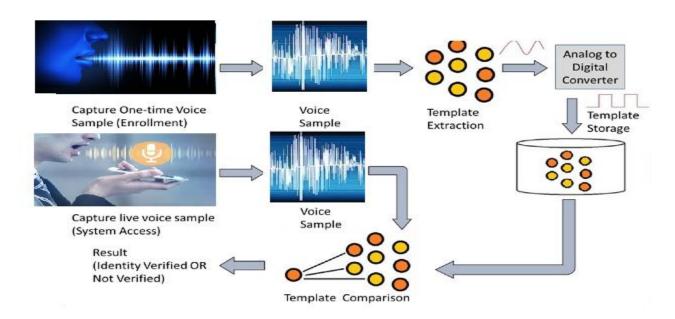
Hand geometry

❑ Beyond a mere finger, your entire hand offers distinctive identifiers.

❑ According to the National Science and Technology Council, hand geometry readers "use a simple concept of measuring and recording the length, width, thickness and surface area of an individual's hand while guided on a plate.

❑ " Some scanners are able to measure the distance between the knuckles to the fingerprints, curvature of the digits and even shadow cast.

Voice Biometry

❑ Also referred to as speaker authentication
❑ This method can verify a person based on patterns of speech.
❑ The combination of pitch, speed and style of speaking can all be traced to individuals.
❑ Users enroll by providing a voiceprint that serves as their credential template.
❑ To gain access, speakers will utter an agreed-upon phrase or word, which may be common to all enrolled individuals or a password specific to each person.

Keystroke dynamic

In this technique, the system analyses the rhythm of typing the password
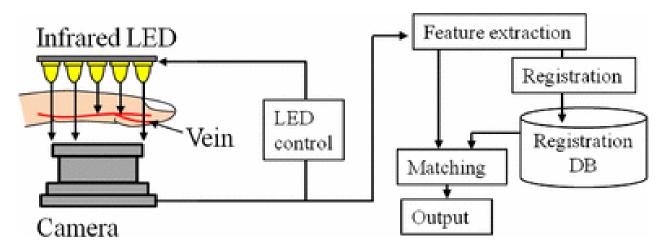
Signature Verification

It is a biometric identification method using a person's signature characteristics (writing speed, pen pressure, shape of loops, etc.) to identify that person

Vein Matching

The network of veins just below the surface of your skin exhibits unique variations and can be detected with infrared light. Unlike external markers, your veins stay in the same place as you age and it would be exceedingly rare for them to become damaged. This contactless option currently has applications for time and attendance, patient identification, and logging onto computers and servers. It is even used to register for the GMAT (a business graduate school exam) to "preserve test integrity."

Gait Identification

The way humans stroll, strut and scurry provide a distinguishing sequence of motion for each individual. Radar or cameras with motion analytics look for repeating dynamics between the neck, shoulders, and limbs. Height, distance, angle and speed between all anatomical features are also measured. A key benefit is that users can be scanned from a distance without stopping.
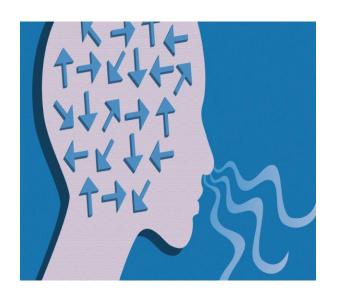
سُورَةُ يُوسُفَ

وَلَمَّا فَصَلَتِ ٱلْعِيرُ قَالَ أَبُوهُمْ إِنِّي لَأَجِدُ رِيحَ يُوسُفَ لَوْلَا أَن تُفَنِّدُونِ ٩٤

And as the caravan set out (from Egypt), their father said (in Canaan): "Indeed I smell the fragrance of Joseph.66 I say so although you may think that I am doting."

Odor/Smell

❑ Odor, which refers to smells, can be utilized as a marker to identify certain problems or sources of interest, such as:

➢ Air pollution,
➢ Environmental contamination,
➢ Disease diagnostics
➢ Human identification in crime investigations

Odor/Smell VOCs

❑ Odor consists of volatile organic compounds (VOCs)
❑ VOCs have molecular masses between 30 and 300 g/mole.

There are hundreds of VOCs in human odor

❑ There are no reports regarding human odor VOC concentrations in the warm current around the human body.

❑ However, if close enough, the human olfactory system is able to smell out the human body odor with a sensitivity of 1 Parts-Per-Million (ppm) to sub Parts-Per-Billion (ppb) level
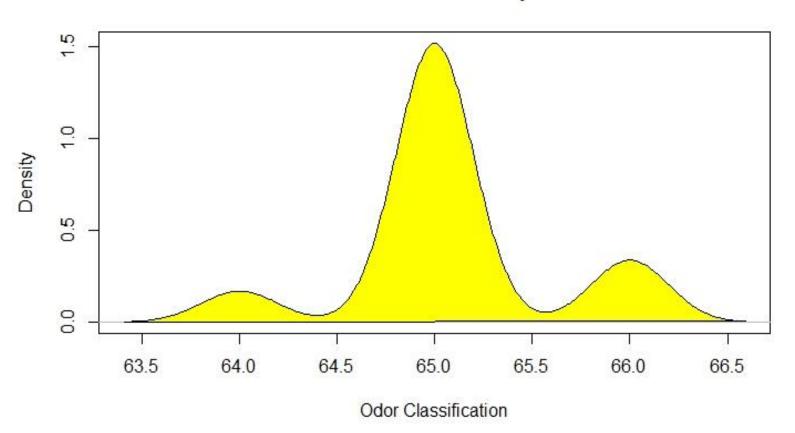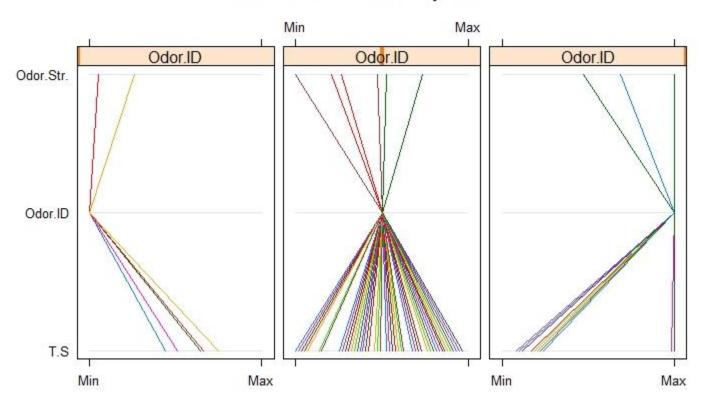
Aim – Odor Transmissions

F-Muscle Cream

Traditional Thai Herbal Cream

F-Muscle Cream Data Samples


```
3/6/2019 1    3/6/2019 1    3/6/2019 12   3/6/2019 12   3/6/2019 12:38

ID,strong     ID,strong     ID,strong     ID,strong     ID,strong
64,148        66,157        65,162        65,148        65,138
64,148        66,157        65,162        65,148        65,138
64,148        66,156        66,167        65,148        65,142
64,148        66,156        65,162        65,148        65,142
64,148        66,156        65,163        65,148        65,143
64,148        66,156        65,163        65,148        66,147
64,148        66,156        65,163        64,148        66,147
65,152        66,156        65,163        64,148        66,147
65,152        66,156        65,163        65,152        65,147
65,152        66,156        65,163        65,152        65,147
65,152        65,152        66,167        65,152        66,151
65,152        66,151        65,163        65,152        66,151
65,152        66,151        65,163        65,157        66,151
65,157        66,151        66,167        65,157        66,151
65,157        66,151        66,167        65,157        66,151
65,157        66,151        65,163        65,162        65,152
65,157        66,151        65,163        65,162        65,152
65,157        66,151        66,167        65,162        65,152
65,162        66,151        65,163        65,162        65,152
65,162        65,147        65,163        65,162        65,152
65,162        66,147        66,167        65,162        65,152
65,162        66,147        66,167        65,162        65,147
65,162        66,147        66,167        65,162        65,147
65,162        66,147        65,163        65,162        65,147
65,163        65,143        65,163        65,162        65,147
65,163        65,143                       65,162
```

F-Muscle-Cream-Sample-1

F-Muscle-Cream-Sample-1

F-Muscle-Cream-Sample-2

F-Muscle-Cream-Sample-2

F-Muscle-Cream-Sample-3

F-Muscle-Cream-Sample-3

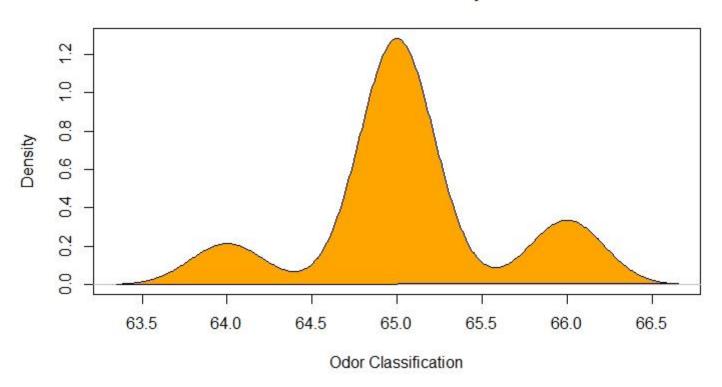# F-Muscle-Cream-Sample-4

F-Muscle-Cream-Sample-4

F-Muscle-Cream-Sample-5
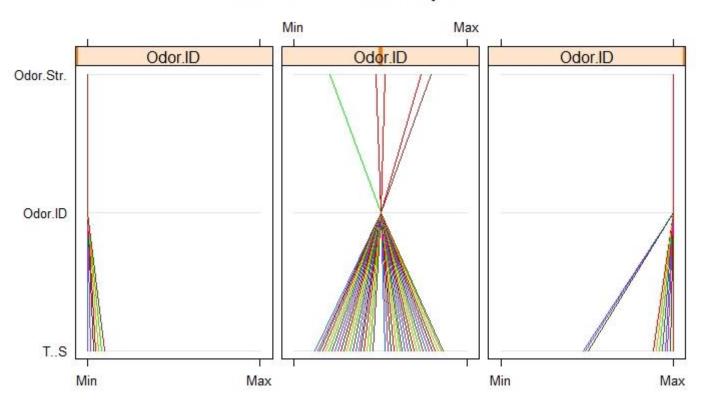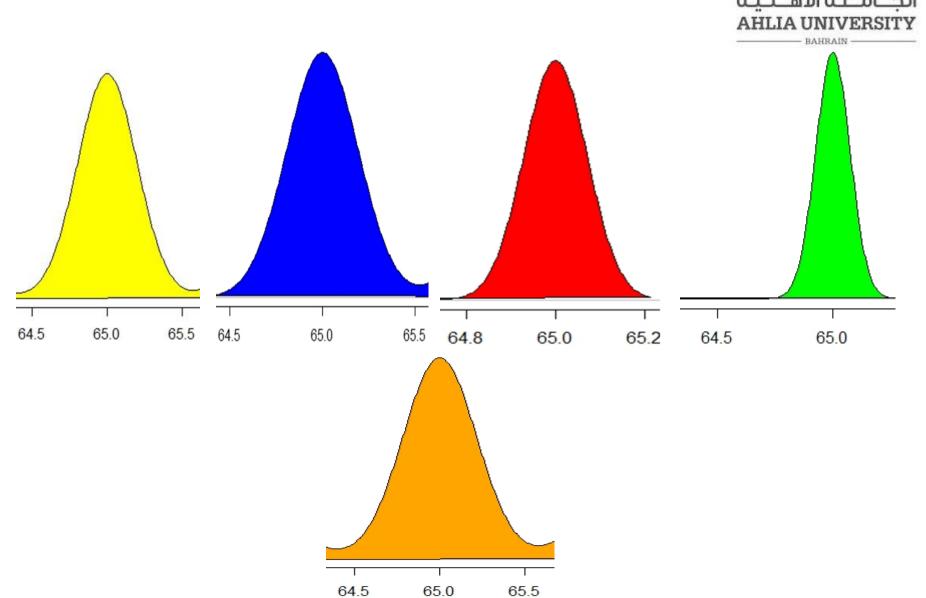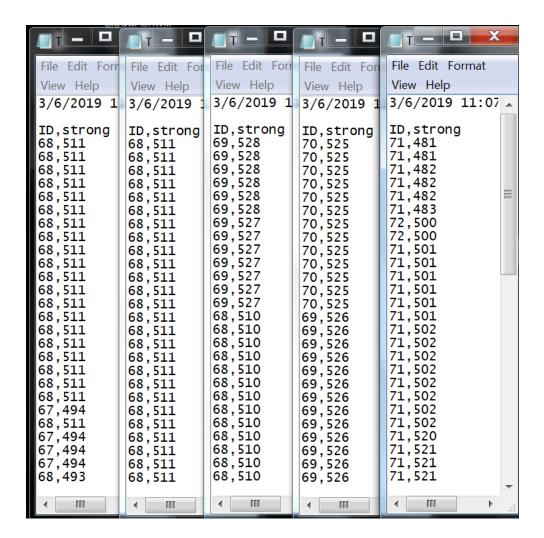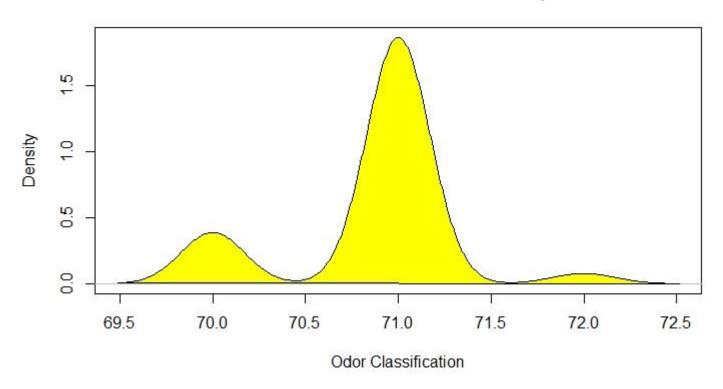
F-Muscle-Cream-Sample-5

Data Purification and Normalization

Traditional Thai Herbal Cream Samples

Traditional-Thai-Herbal-Inhlant-Sample-1

Traditional-Thai-Herbal-Inhlant-Sample-2

Traditional-Thai-Herbal-Inhlant-Sample-3

Density

Odor Classification

Traditional-Thai-Herbal-Inhlant-Sample-4

Traditional-Thai-Herbal-Inhlant-Sample-5

Data Purification and Normalization

Basic Design

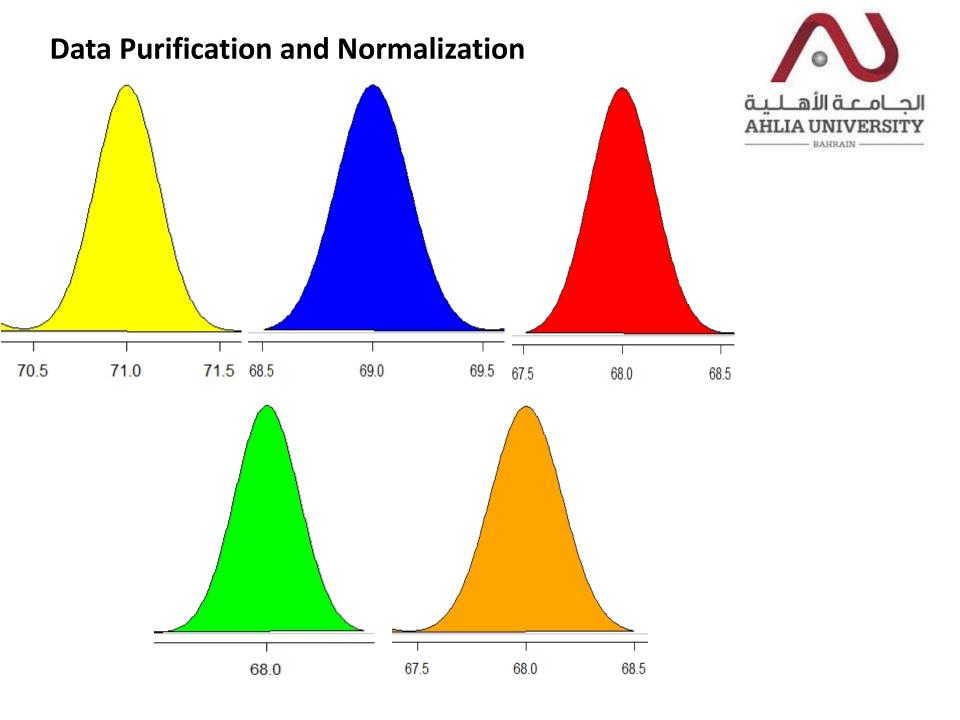Body Odor   Chemical Sensor Array   Neural Network   Odor Identified
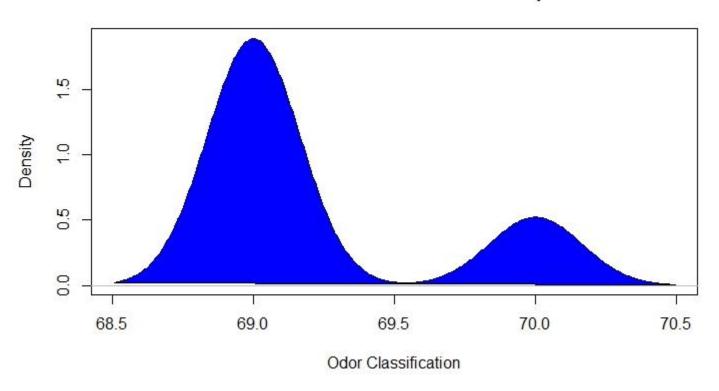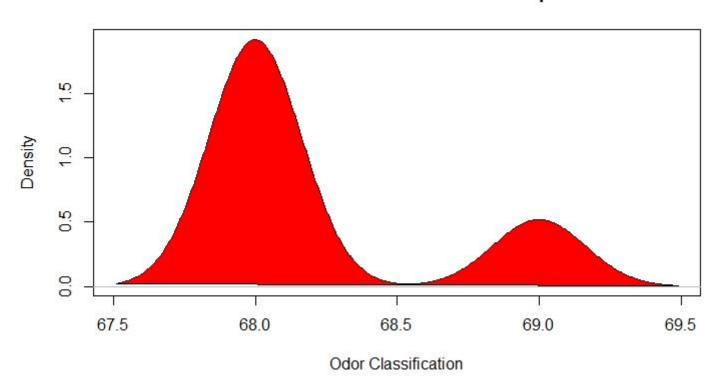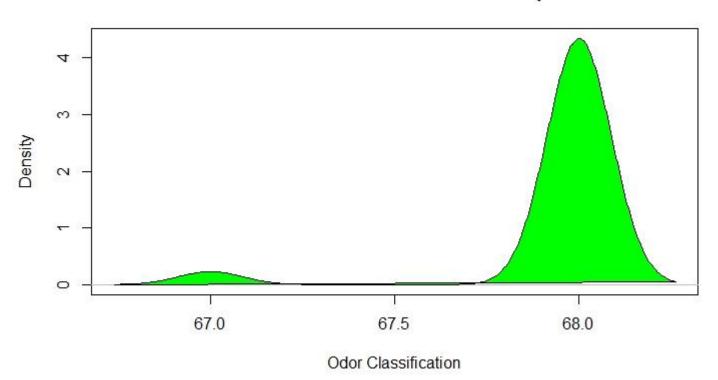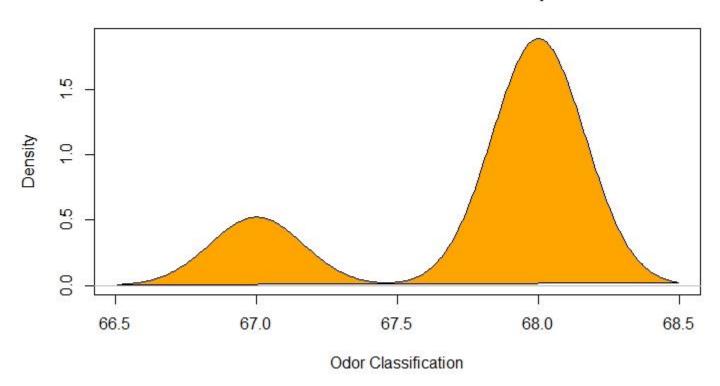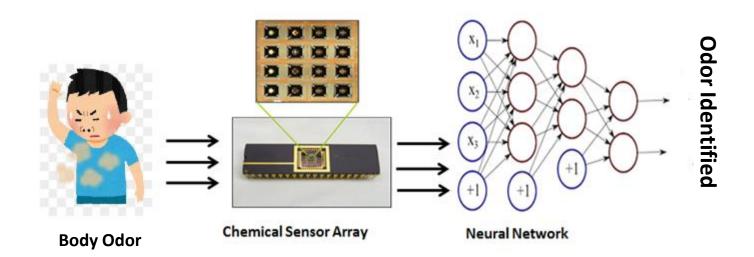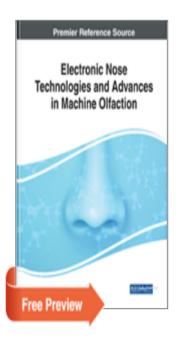
Electronic Nose Technologies and Advances in Machine Olfaction

Noted as an IGI Global Core Reference Title in Engineering for 2019.

Yousif Abdullatif Albastaki (Ahlia University, Bahrain) and Fatema Albalooshi (University of Bahrain, Bahrain)

Free Preview

Hardcover:	$164.00	E-Book:	$164.00	Hardcover + E-Book:	$196.00
	List Price: $205.00		List Price: $205.00		List Price: $245.00