

MOBILE ROBOTS Case Studies 3

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Session ID: **120869**



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Face recognition

There are software using computer vision to recognize gender in picture of people. An analysis* of the performances of the Microsoft version shows that this software works poorly on darker-skinned females, why?

Classifier	Metric	All	F	M	Darker	Lighter	DF	DM	LF	LM
MSFT	PPV(%)	93.7	89.3	97.4	87.1	99.3	79.2	94.0	98.3	100
	Error Rate(%)	6.3	10.7	2.6	12.9	0.7	20.8	6.0	1.7	0.0
	TPR (%)	93.7	96.5	91.7	87.1	99.3	92.1	83.7	100	98.7
	FPR (%)	6.3	8.3	3.5	12.9	0.7	16.3	7.9	1.3	0.0

A – There is a problem in the way the software is coded

B – Darker color levels are harder to distinguish

C – It's not a vision or coding problem

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* Buolamwini, J., & Gebru, T. (2018, January). Gender shades: Intersectional accuracy disparities in commercial gender classification. In *Conference on fairness, accountability and transparency* (pp. 77-91).

Face recognition

There are several software that use computer vision to recognize the gender in picture of people. An analysis* of their performances shows that these software works poorly on darker-skinned females, why?

It's not a coding problem, and cannot be a vision problem, it's a problem of learning data.



Figure 3: The percentage of darker female, lighter female, darker male, and lighter male subjects in PPB, IJB-A and Adience. Only 4.4% of subjects in Adience are darker-skinned and female in comparison to 21.3% in PPB.

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Sensors

You need to design a robot for dense swarm operations (robots of about 1dm^3 of volume, 20 robot / m^2 , hundreds of robots in the same area). You need to choose a sensor for distance measurements of obstacles in front of the robot, what do you choose:

A – Time-of-flight camera

B – Triangulation camera, with projection of pattern

C – Stereo camera

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Sensors

Consider a camera system taking static images at several random angles when rotating around its focal point in a forest. What is the cheapest hardware device (do not consider cost of processing) one can use to retrieve a 3D reconstruction of the surrounding?

- A – Time-of-flight camera**
- B – Triangulation system based on camera**
- C – Stereo camera**
- D – Monocular camera**



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