What are they doing with my **fingerprint, face** and **iris** images?

Andy Adler
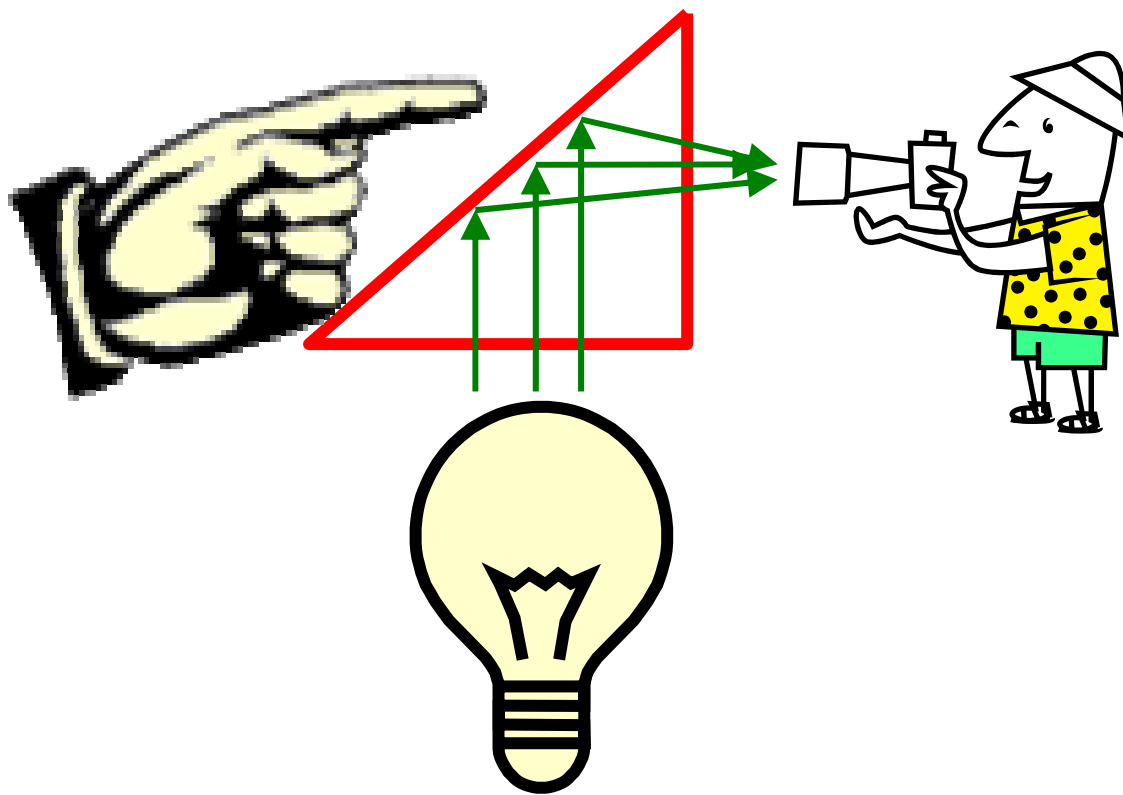uOttawa

Fingerprint: *Rolled ink*
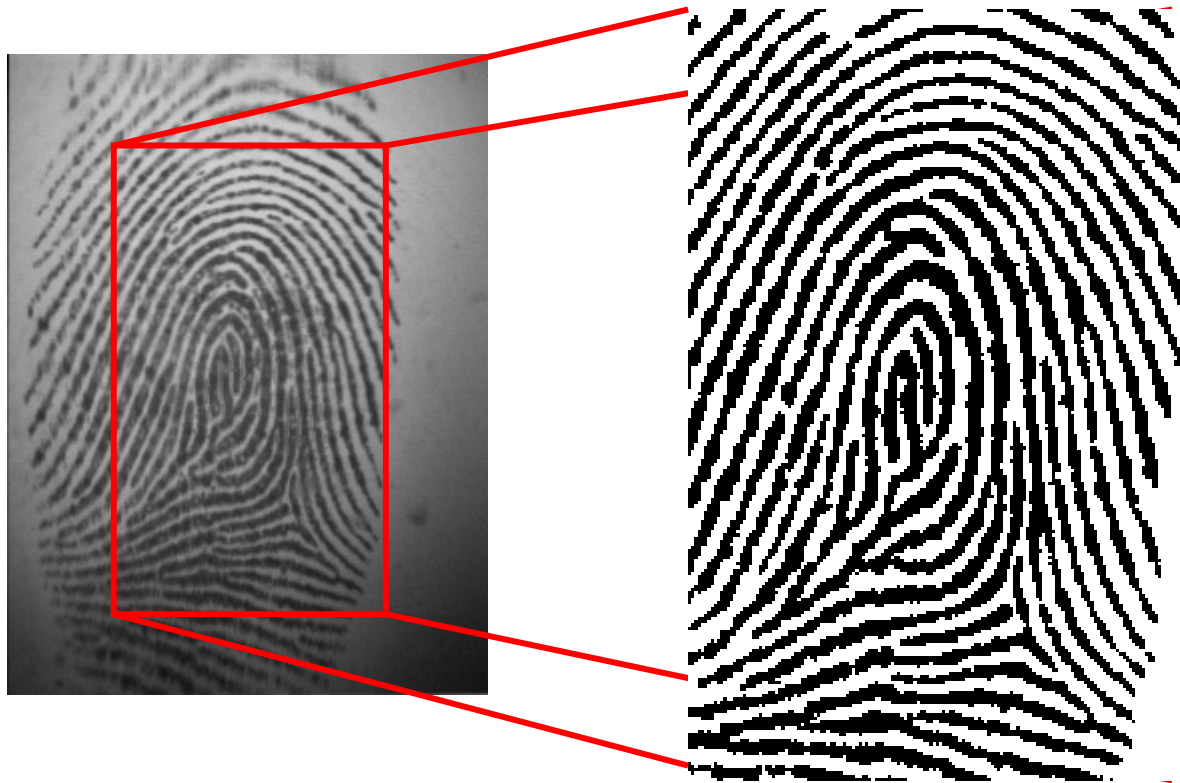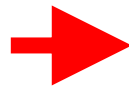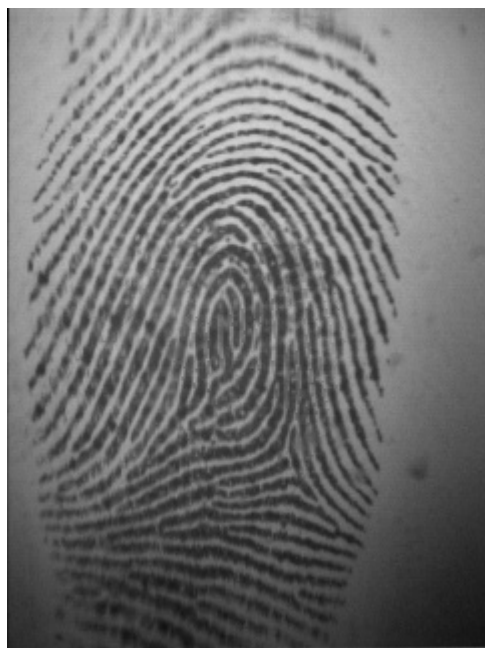

Ink Roller
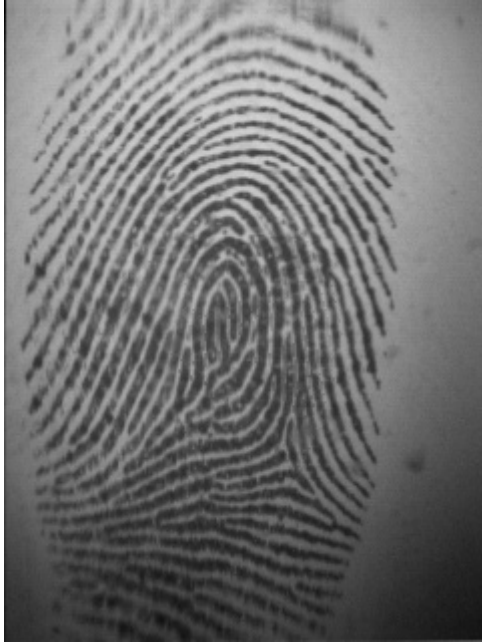
Fingerprints: *Optical Scanner*

Cleaned fingerprint

Get features: *minutiae*

Fingerprint: *Compare*

**Optical
Scanner
1998**

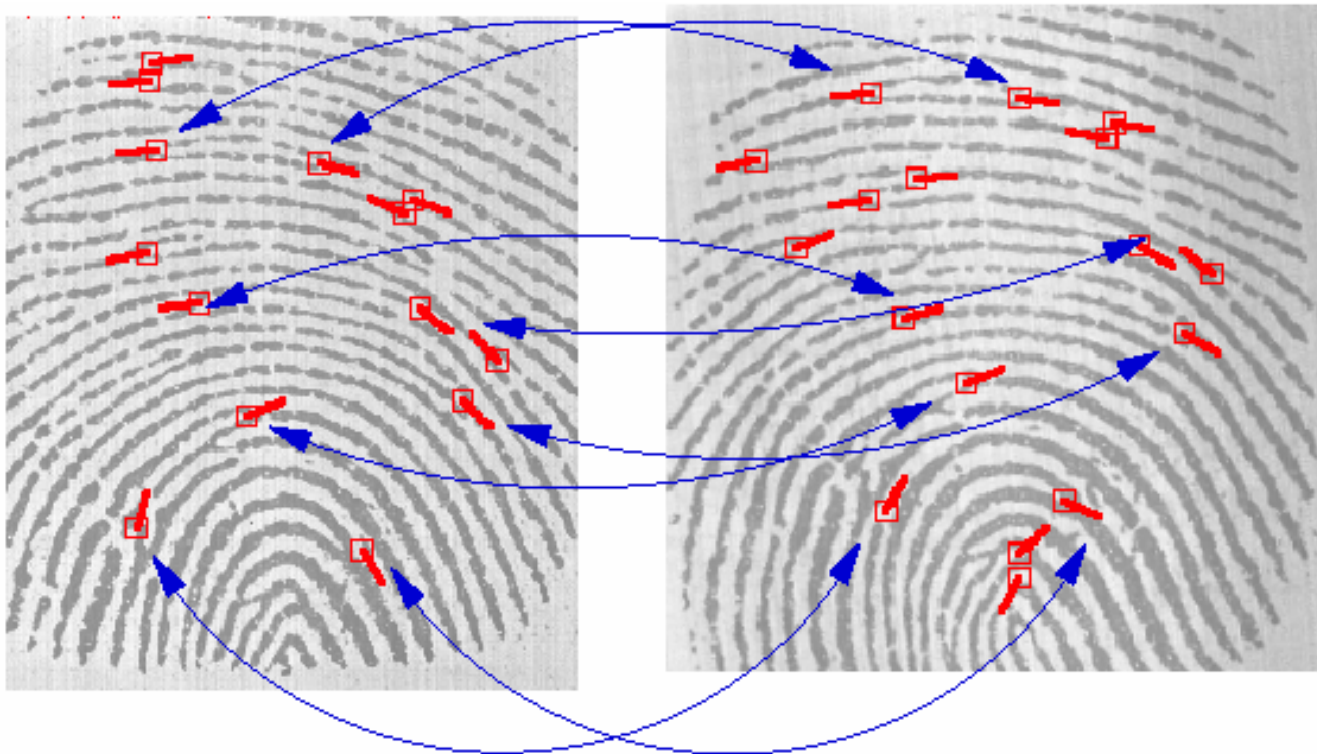**Capacitive
Scanner
2004**

Fingerprint Comparison

Fingerprint examples
Thumbs from my family

Age 4   Age 6   Age 34   Age 35   Age 65

Are fingerprints unique?

What do you mean by unique?

Cut

Moved

Less pressure
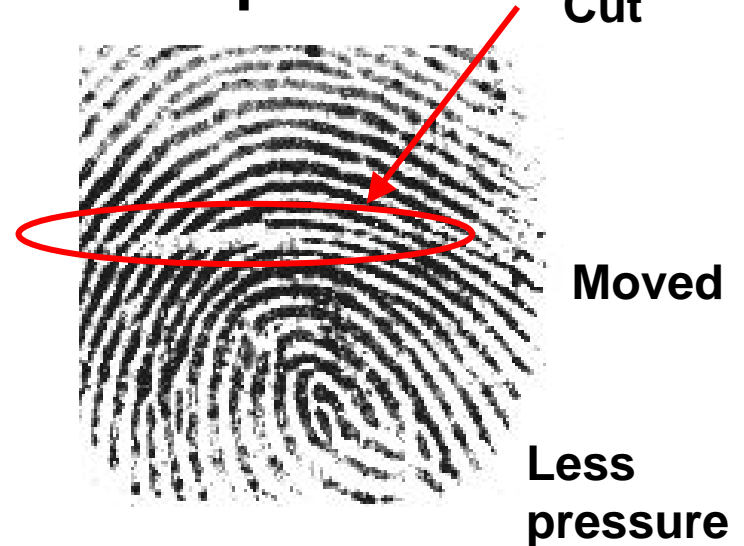
Real Question:
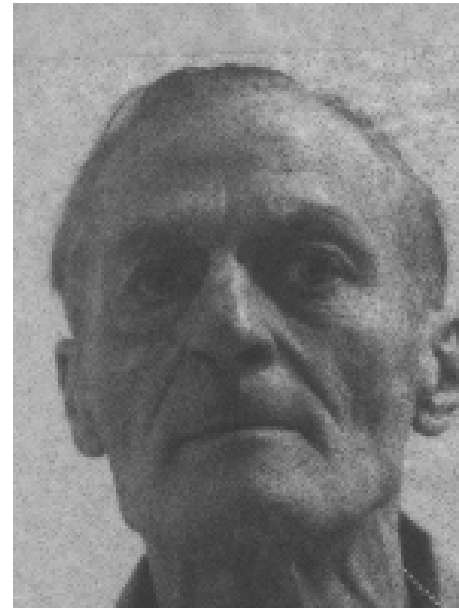*Are fingerprints distinguishable?*

Fingerprint demo

- Thanks to Precise Biometrics

Face Recognition:

same person?

Same person?

Yes

- I have just demonstrated a massively parallel face recognition computer

- Question:
  Are computers better or worse than people at faces?

How do computers recognize faces?
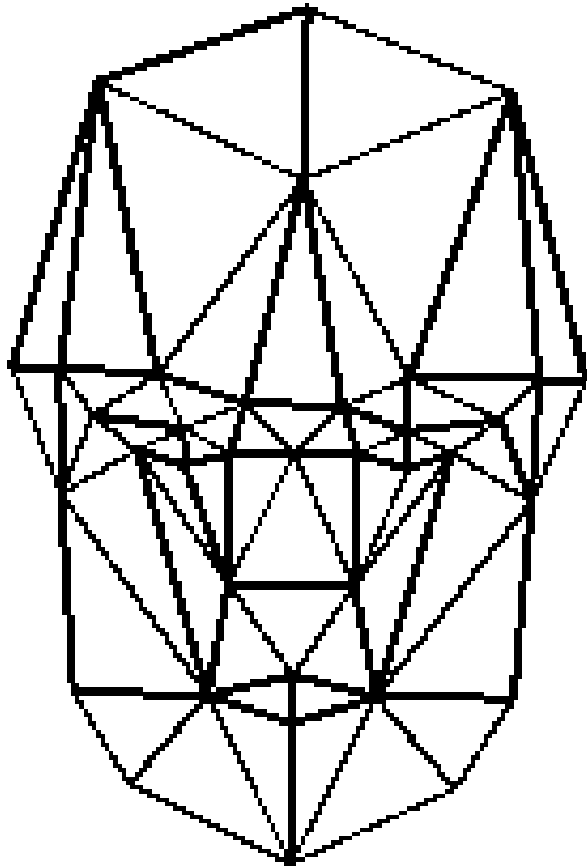
Landmarks

Eigenfaces

Face Recognition Demo

- Thanks to Identix

People are **Better** *(for now)*

Best performing SW available to us in each year
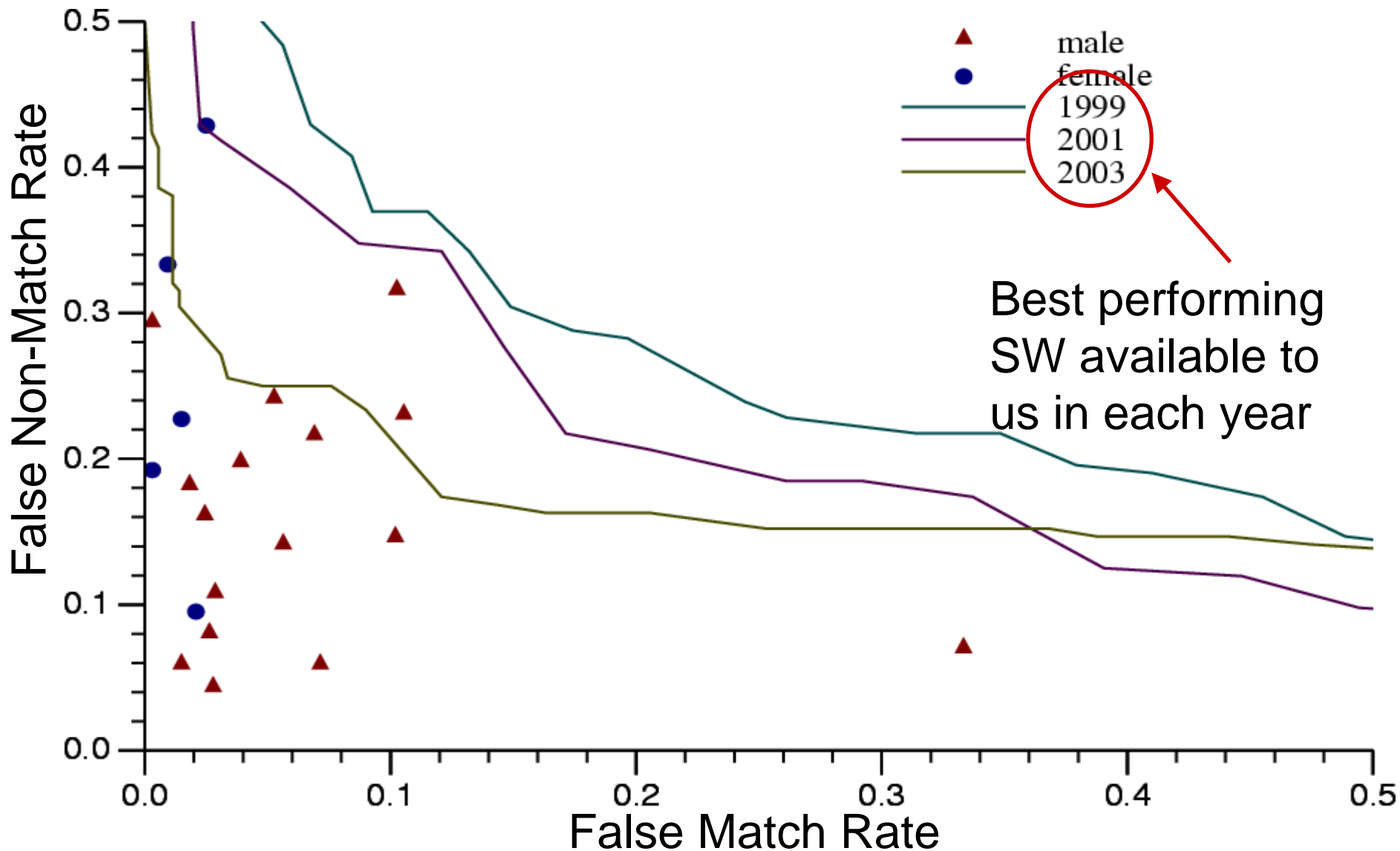
Iris

Iris: *Processing*

Remove Image parts
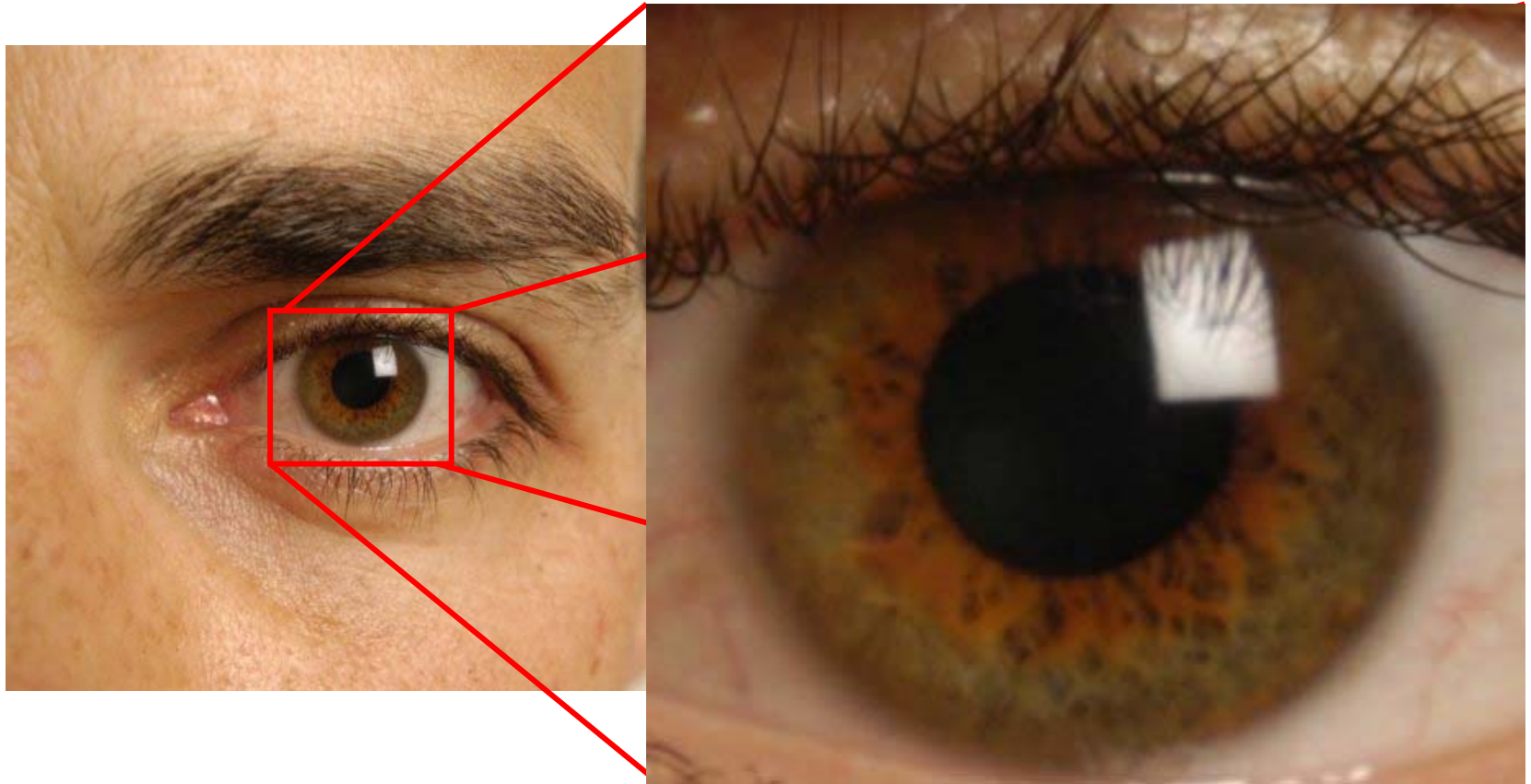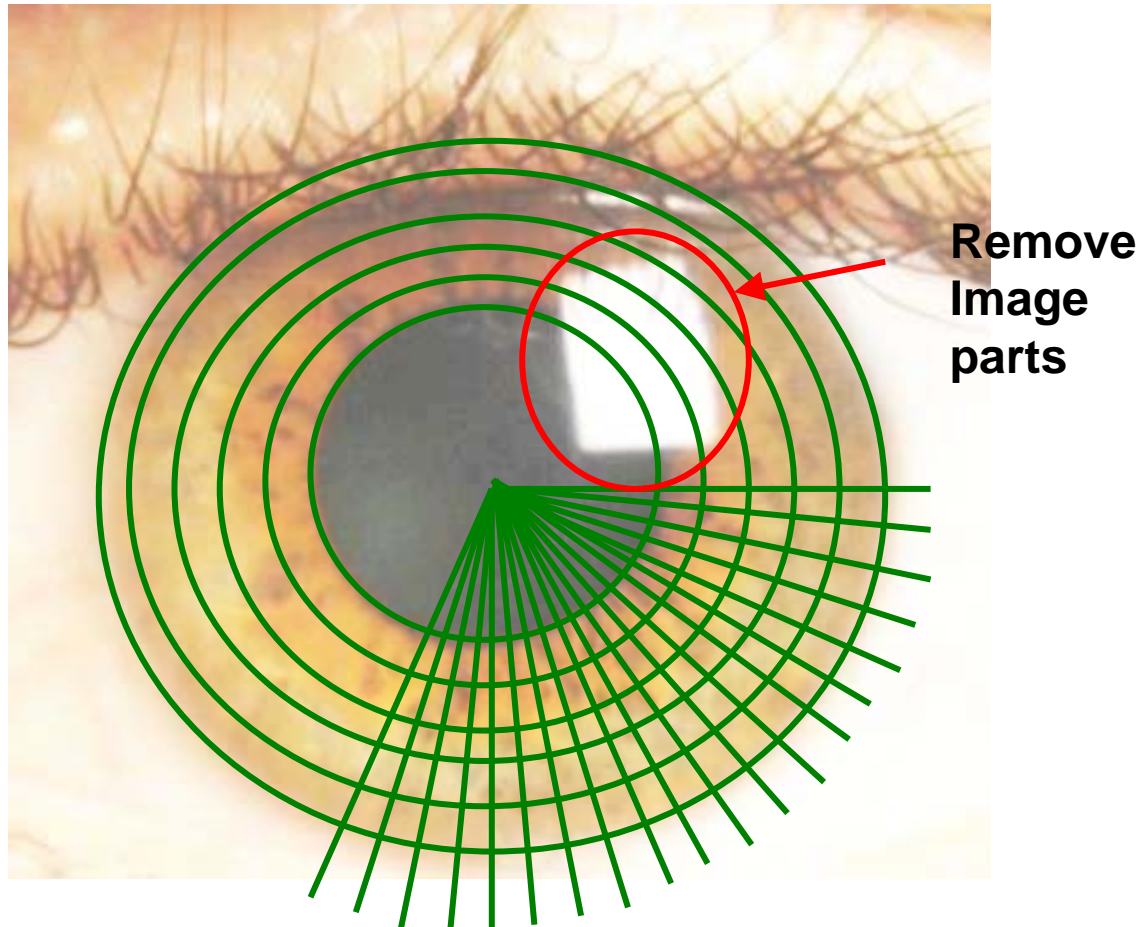
How is this used?
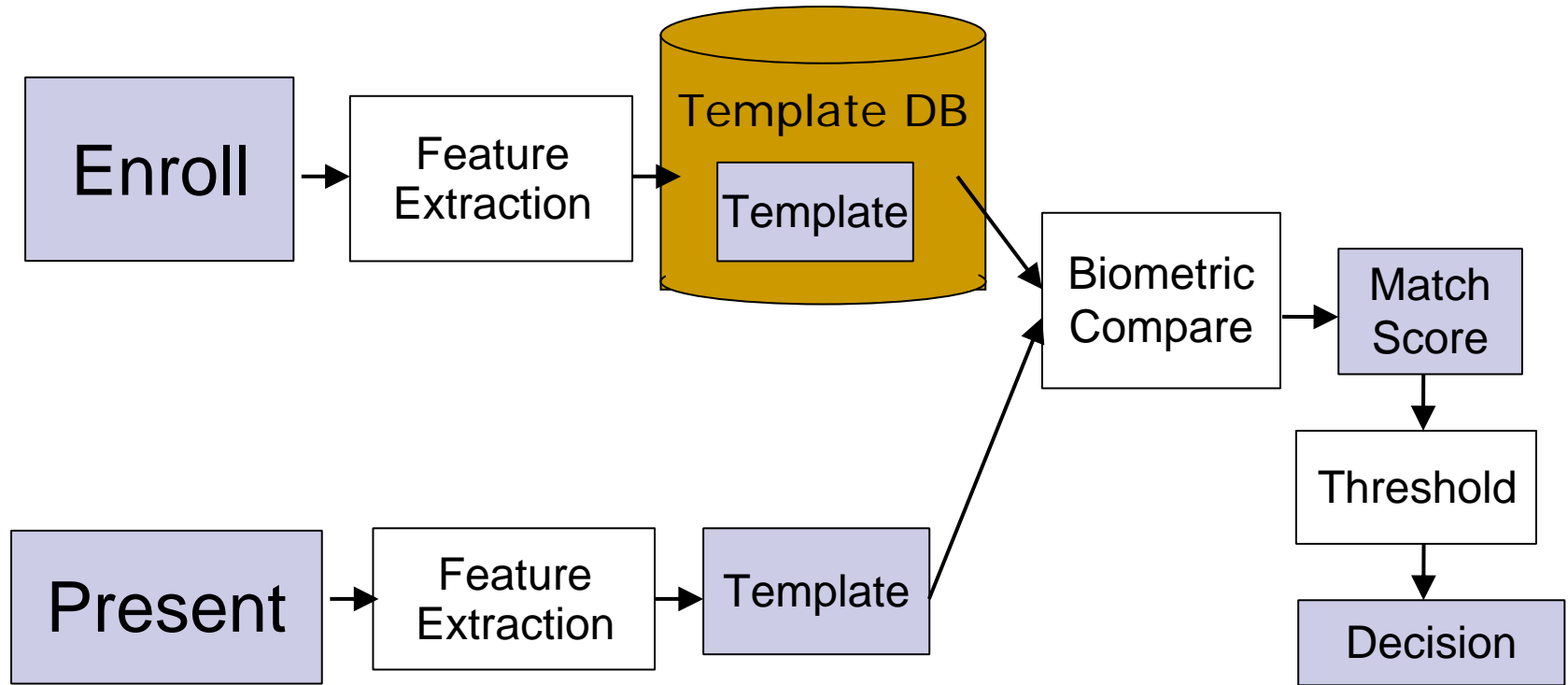
What can go wrong?

	Face	Finger	Iris
Failure to enroll	0%	3%	7%
Failure to acquire	3%	10%	10%
False Match	1%	10ppm	1ppm
False non-match	5%	1-5%	1-5%

What else can go wrong?

Multiple enrolment

Invalid data

Fraudulent Enrolment

Enroll difficult image

Database integrity

ID card integrity

Modify weighting of fusion

Biometric "Enrolled Image" → Feature Extraction → **Template DB** [Template]

Lookalike

Impostor

Regenerate image

Replay at sensor

Confuse Algorithm (tilt head, squash finger)

Reverse engineer algorithm
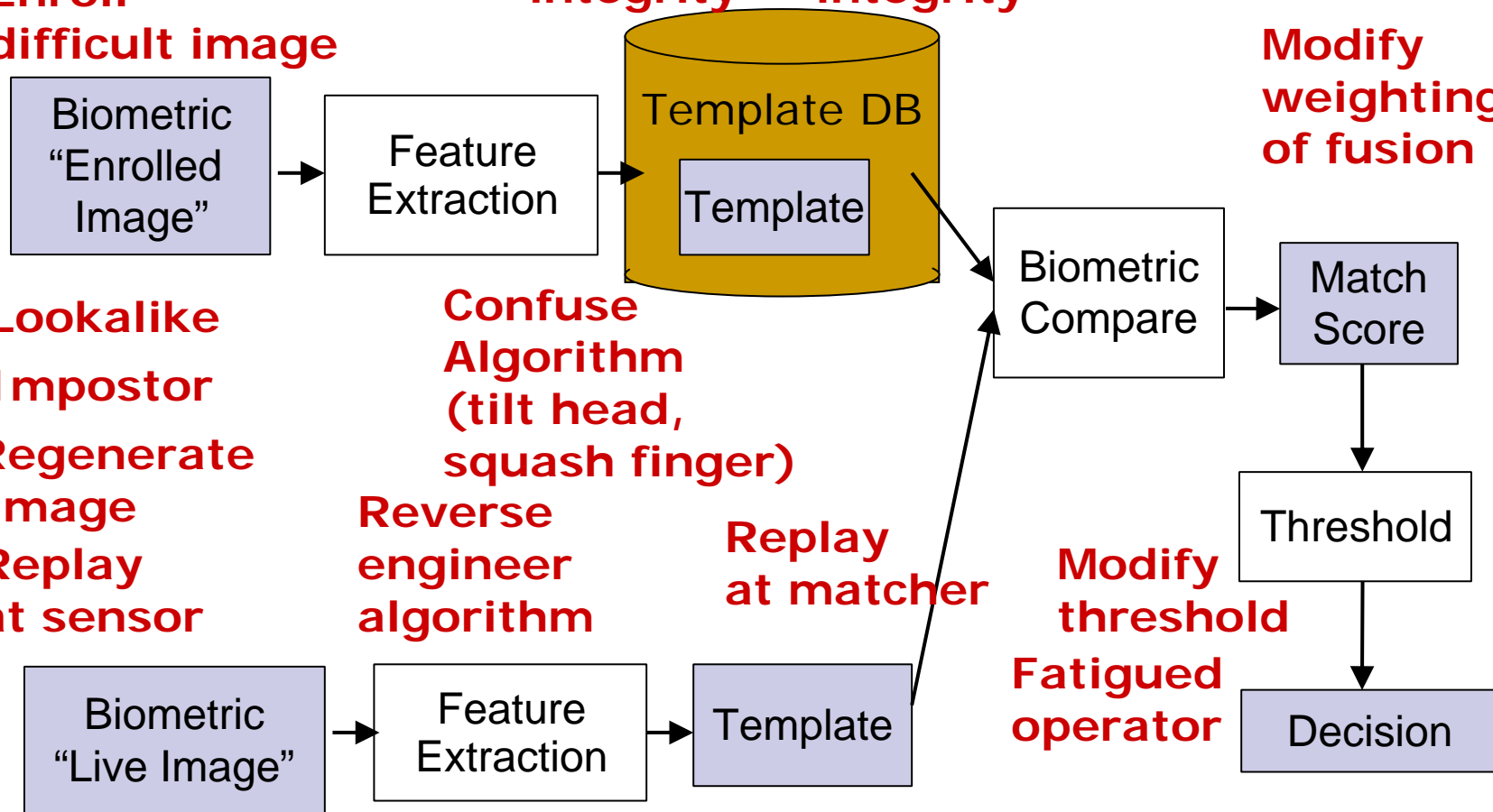
Replay at matcher

Biometric Compare → Match Score → Threshold → Decision

Modify threshold

Fatigued operator

Biometric "Live Image" → Feature Extraction → Template

What else can go wrong?
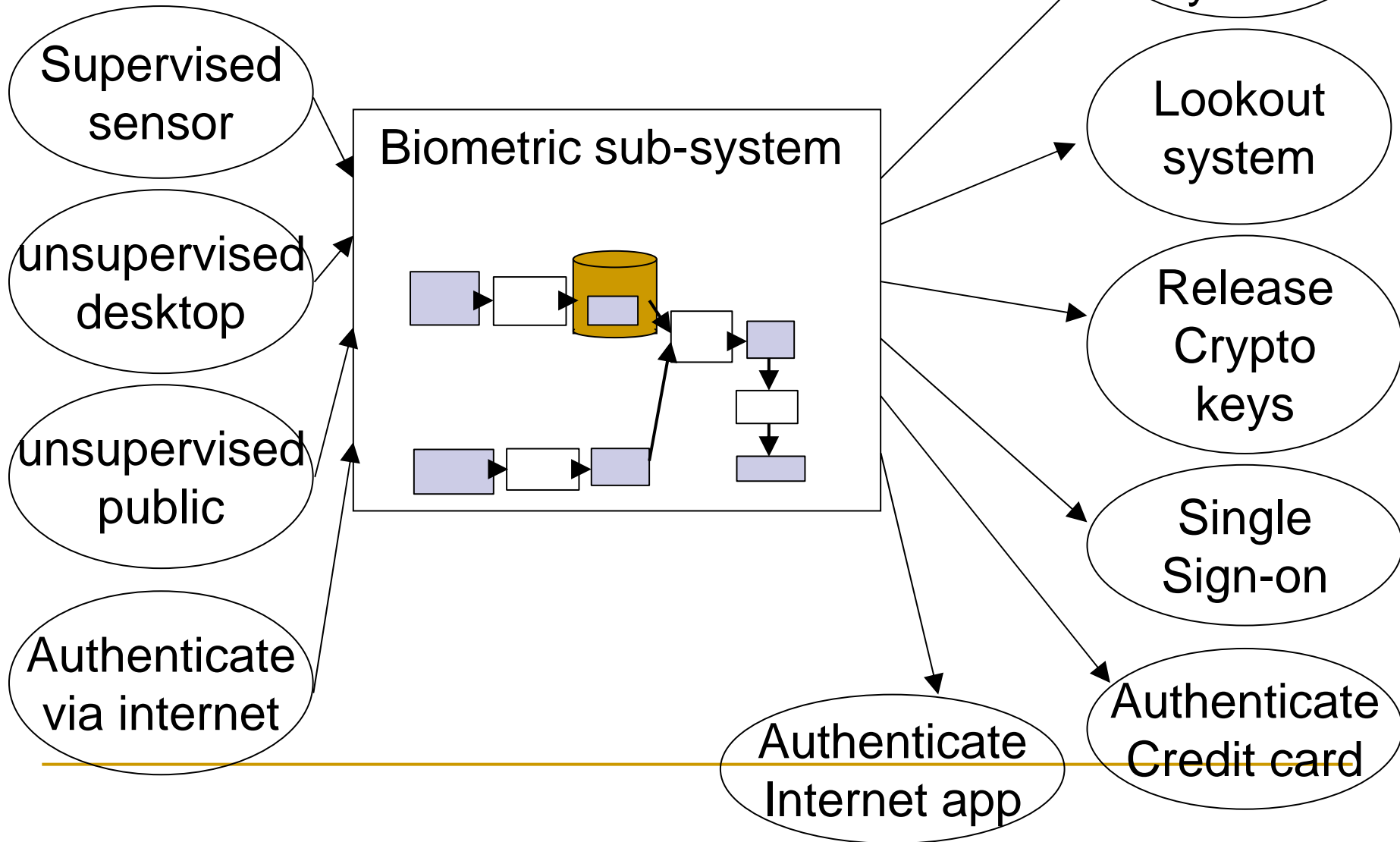
Epilogue: Our future?

Operator: "Thank you for calling Pizza Hut."

Customer: "One All-Meat Special..."

Operator: "Thank you, Sir. Your voice print verifies with your National ID Number: 6102049998"

Customer: (Sighs) "I'd like to order an All-Meat Special pizza..."

Operator: "I don't think that's a good idea, sir."

Customer: "Whaddya mean?"

Operator: "Sir, your medical records indicate that you've got very high blood pressure and cholesterol. Your Health Care provider won't allow such an unhealthy choice."

Customer: "Darn. What do you recommend, then?"

Epilogue:

Operator: "You might try our low-fat Soybean Yogurt Pizza. I'm sure you'll like it"

Customer: "What makes you think I'd like something like that?"

Operator: "Well, you checked out 'Gourmet Soybean Recipes' from your local library last week, sir."

Customer: "OK, lemme give you my credit card number."

Operator: "I'm sorry sir, but I'm afraid you'll have to pay in cash. Your credit card balance is over its limit."

Customer: "@#%/$@&?#!"

Operator: "I'd advise watching your language, sir. You've already got a July 2006 conviction for cussing … "

Thanks

Merry Christmas and

Happy new year