Challenge Problems

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NIST

Problem Definition

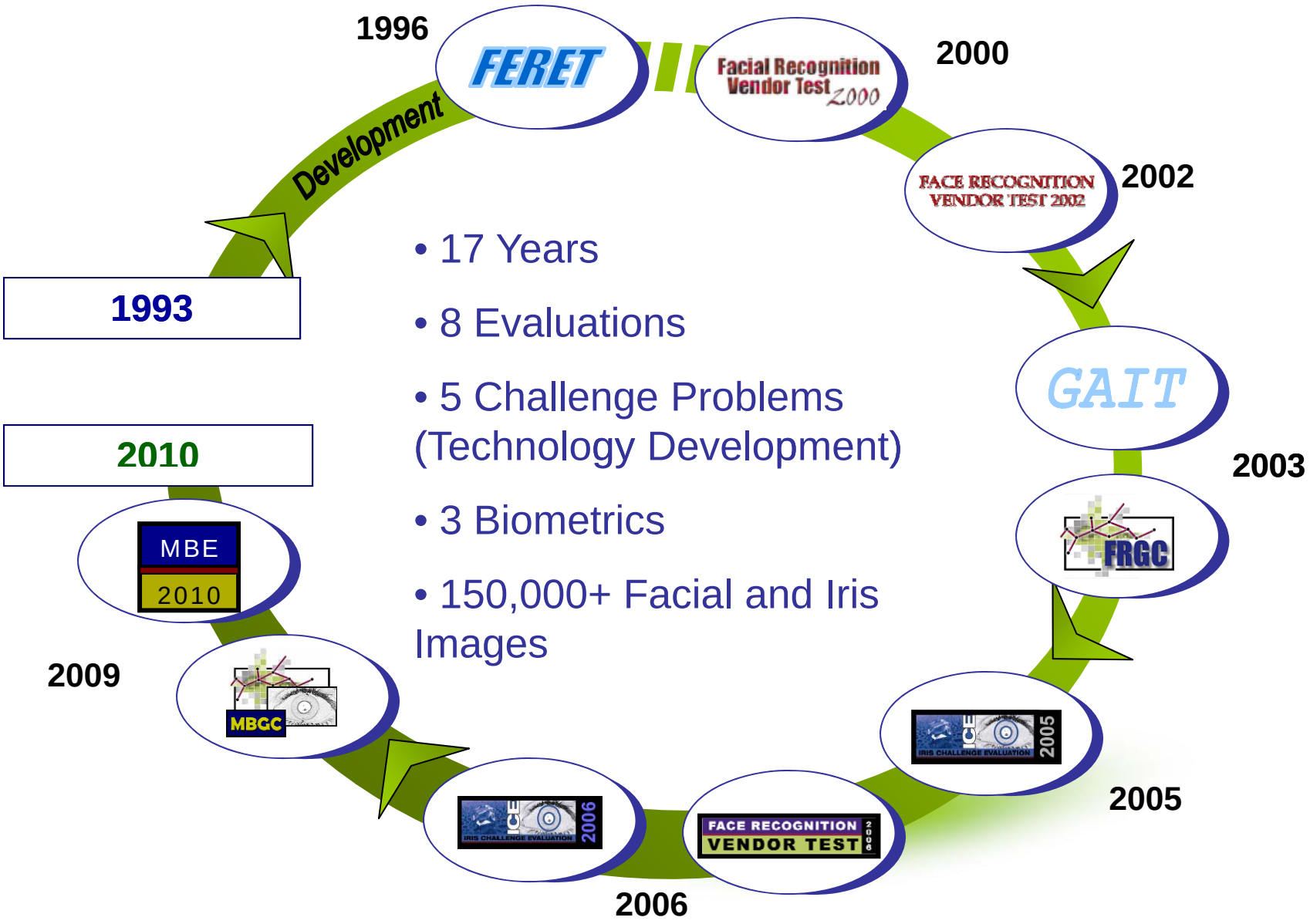
- Frontal Faces
- One Face Image per Person

Problem 1: Controlled Studio Environment

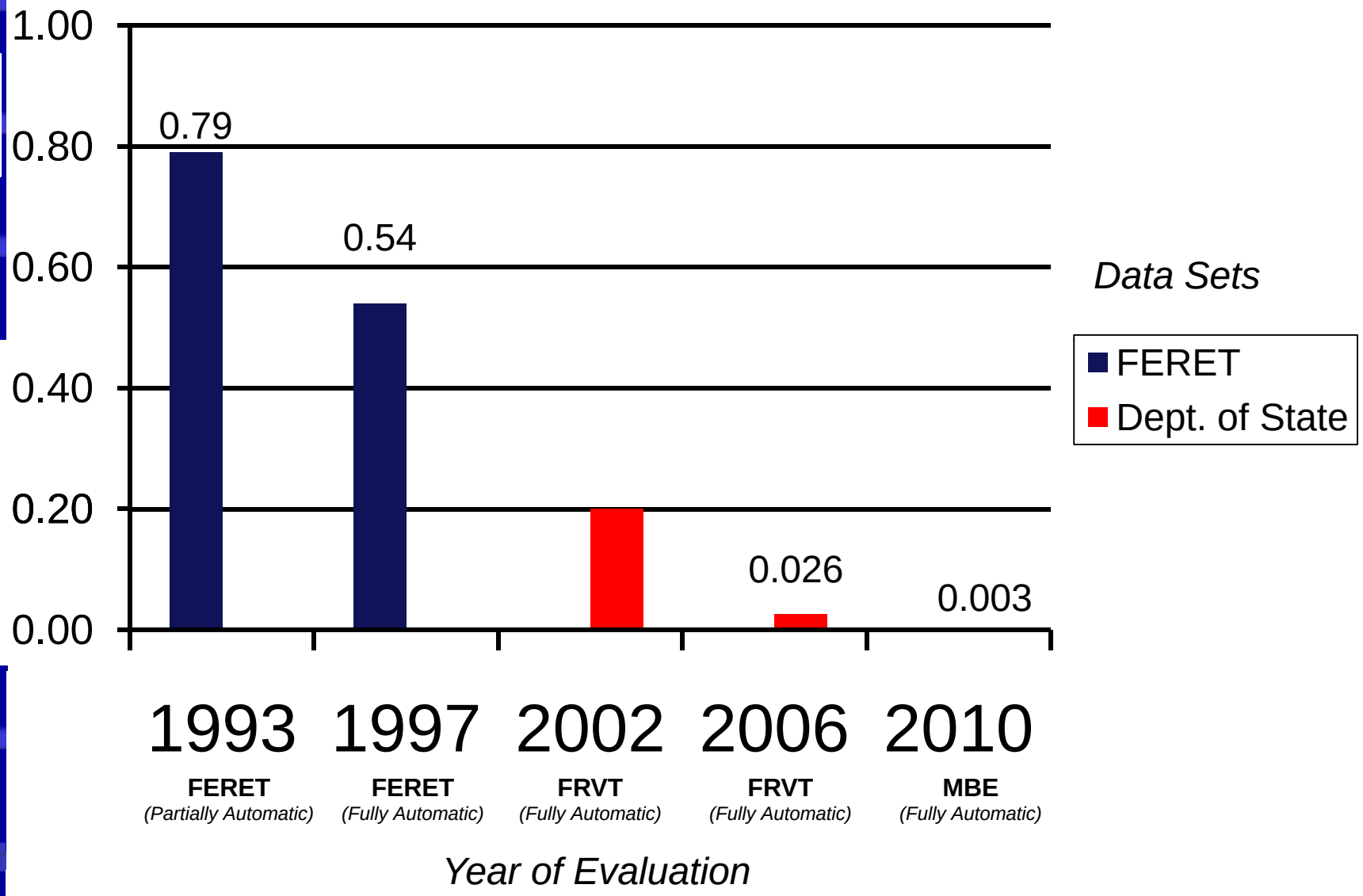

Problem 2: Studio vs. Ambient Lighting


or

Technology Progress

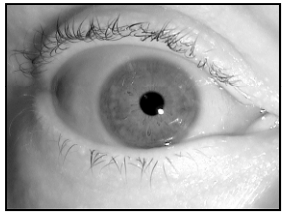


From FERET to MBE 2010



Challenge Problems

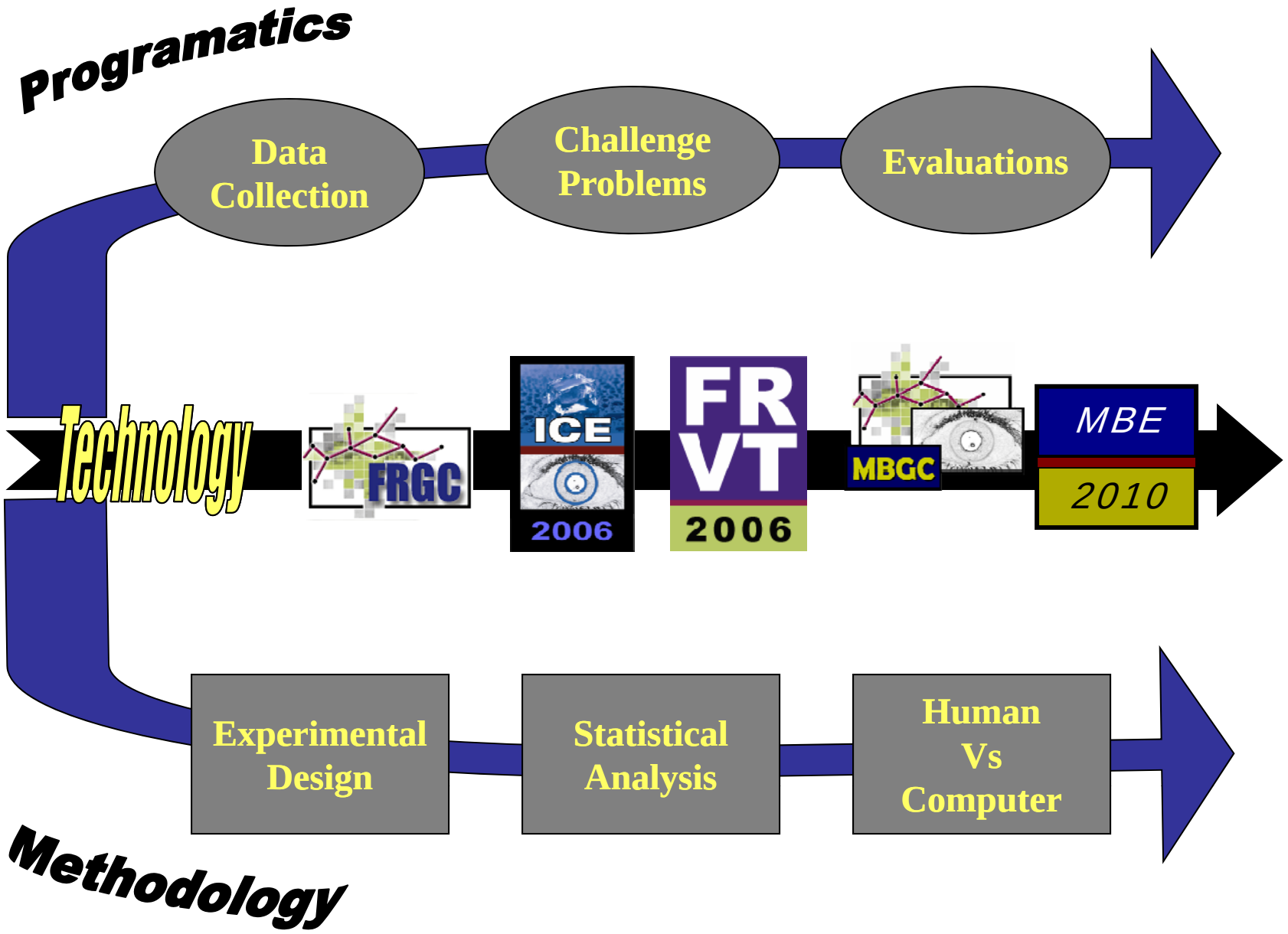
- What are challenge problems?
  - A series of experiments designed to advance a technology's state-of-the-art
    - Experiments designed
    - Experiments and test data distributed to researchers
    - Researchers complete experiments and submit results
    - Scores are consolidated and reported
  - Introduction of new technology
  - Not an independent evaluation
    - NO sequestered data



What Is An Independent Evaluation?

- Independent assessment of performance by a third party
- Algorithms submitted to tester
- Algorithms are tested on sequestered data
- Results scored by tester
- Provides snapshot of current technology state-of-the-art

Advancing Technology and Methodology



Methodological Progress

1994: First Modern Technology Evaluation

2001: Re-sampling Techniques

Development

FERET

Facial Recognition Vendor Test 2000

1996

2000

FACE RECOGNITION VENDOR TEST 2002

2002: First Evaluation with 100,000+ samples

1993

2002

GAIT

2010

FRGC

2003

2004: Statistical Modeling

2010: 1 Million + face image evaluation

MBE 2010

2010

2006

2005

FACE RECOGNITION VENDOR TEST

2006

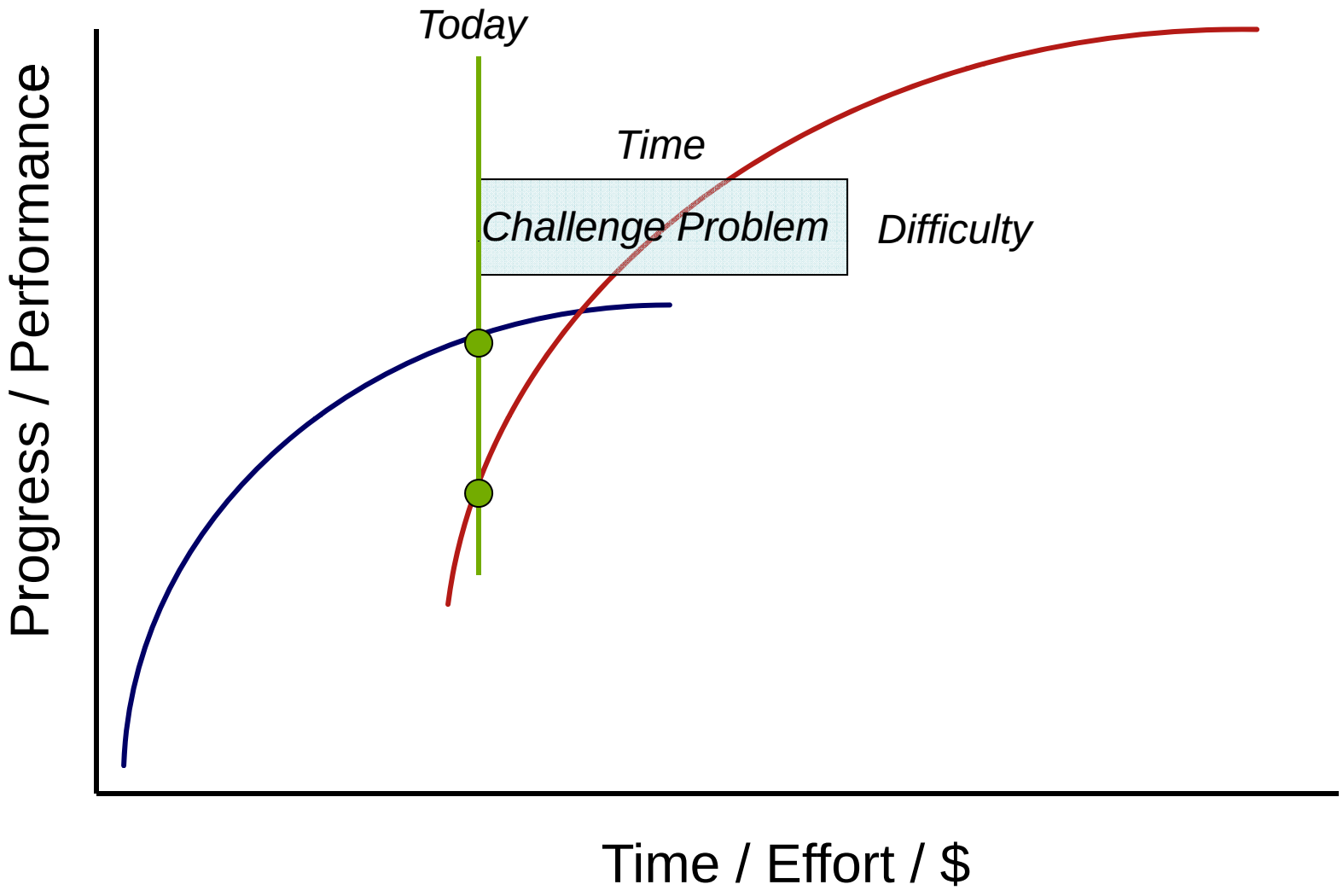
2004: Human & Computer Performance

2008: Covariate Analysis of Quality

2007: Iris Meta-analysis

NIST

Ideal Challenge Problem

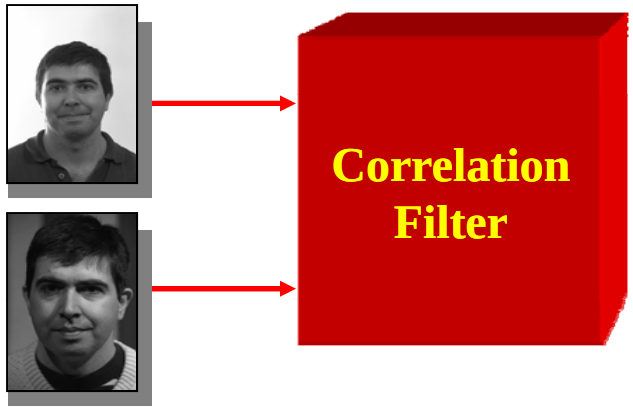


Challenge Problems and Technology Development

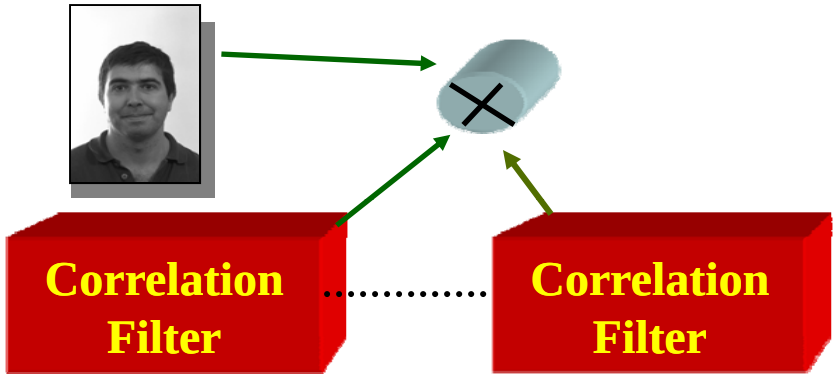
Example: Advanced Correlation Filter Method *

January 2005
MACE

Training - One Filter/Person

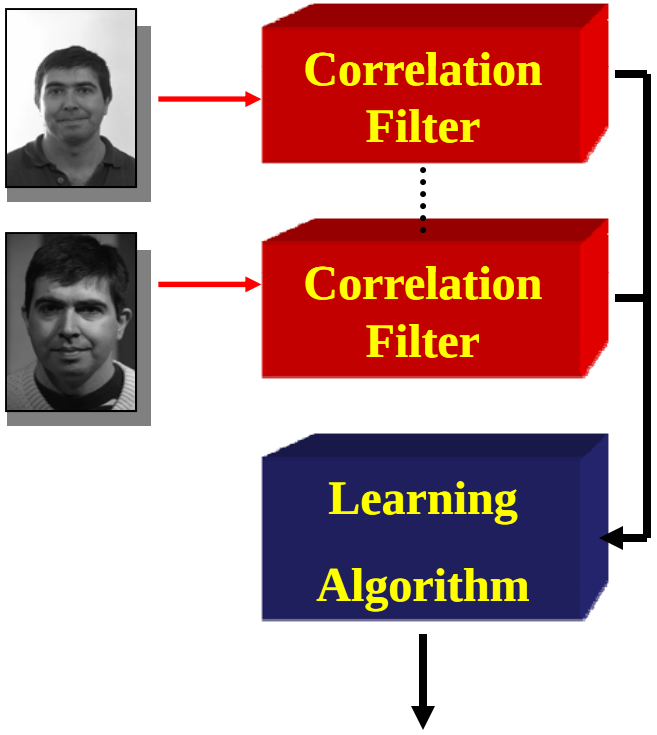


Recognition – Compare all Filters



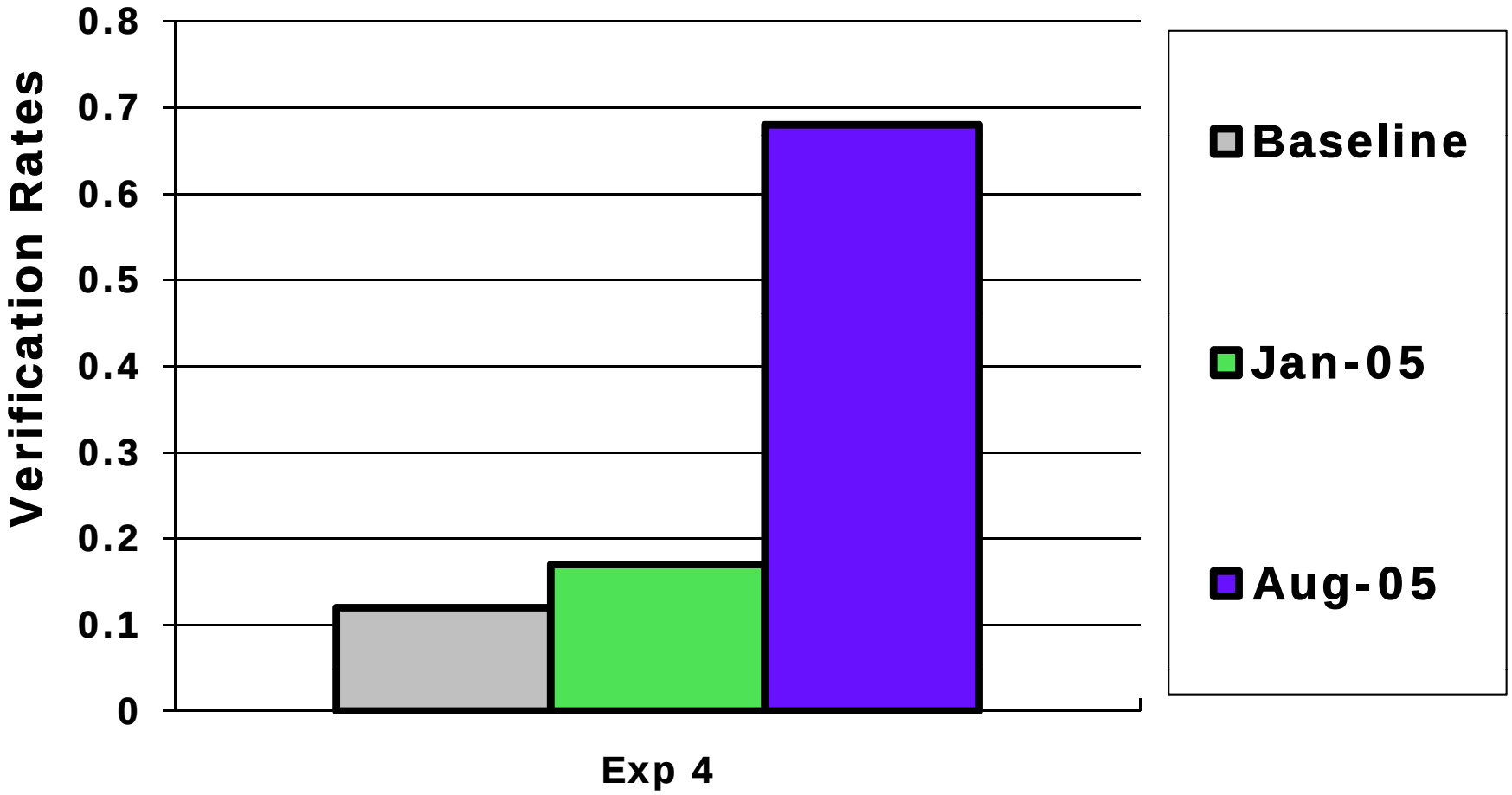
August 2005
Kernel Correlation Filter

Offline Training



* Xie, Savvides, Kumar 2005

Evolution of Improvement



Building a Challenge

- Goals—Simple and grandiose
- Setting goals—Cheat
- Complete infrastructure for challenge problems
- Open to all

Conclusion on Basic Design

- Challenge problems
  - A very powerful tool
  - **NOT** the only tool
- A well designed challenge problem
  - Advances technology
  - Good Investment
  - 10+ year life span
- Poorly designed challenge problem
  - Waste resources
  - 10+ year life span

Summary

- Frontal Face Recognition
- Three orders of magnitude improvement
- Challenge Problems & Evaluations key components
- Development of new techniques
- Interdisciplinary Field
- Significant amount of research left
  - Face recognition form video
  - Low quality still images
  - Non-frontal stills recognition