



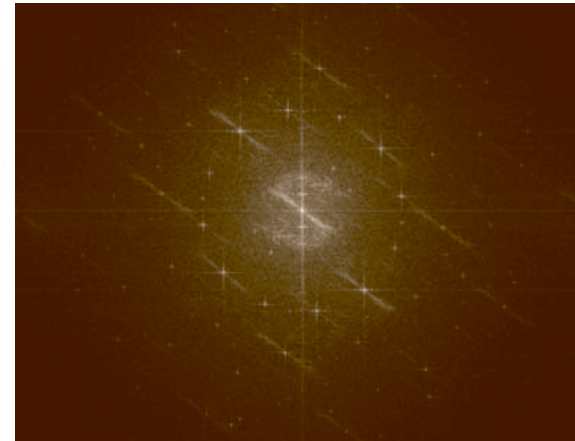
When failure to match is not an option

Innovative new technology for accurate
matching of low-quality fingerprints



Warwick Warp

- Incorporated Jan 2006.
- Spin out from the Image Processing Group, Department of Computer Science, University of Warwick.
- Offices at Venture Centre, Warwick Science Park, Coventry, UK.
- 8 employees, R&D team of 7 people. Strong image processing technical and commercial development experience.
- 3 patents pending.
- Commercialization started January 2009.



Confidential

warwick warp

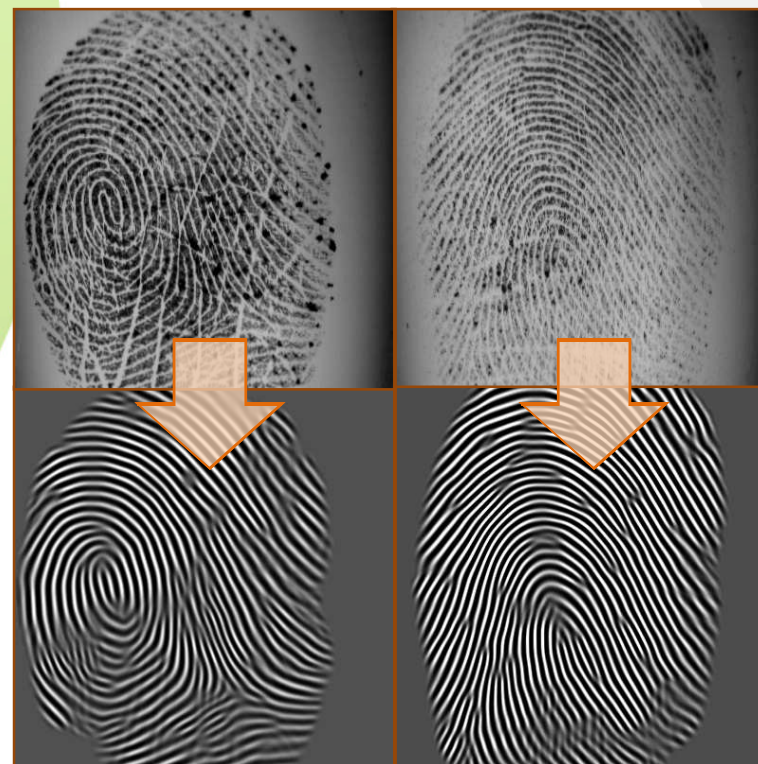
Technology

- Objective is to increase the accuracy of fingerprint matching.
- Technical problem is fingerprint variation and associated low quality issues; scars, smudges, scratches, wear & tear, age & occupation, linear & elastic distortion.
- Increasing accuracy by dealing with fingerprint quality issues is important;
 - Opens up new applications where there is a higher proportion of low quality fingerprints.
 - Reduces the costs associated with specialist intervention.
 - Reduces false acceptance and rejection rates.
 - Increases matching success rates for law enforcement applications.
 - Reduces terrorists ability to exploit weaknesses in biometric system design.



Technology

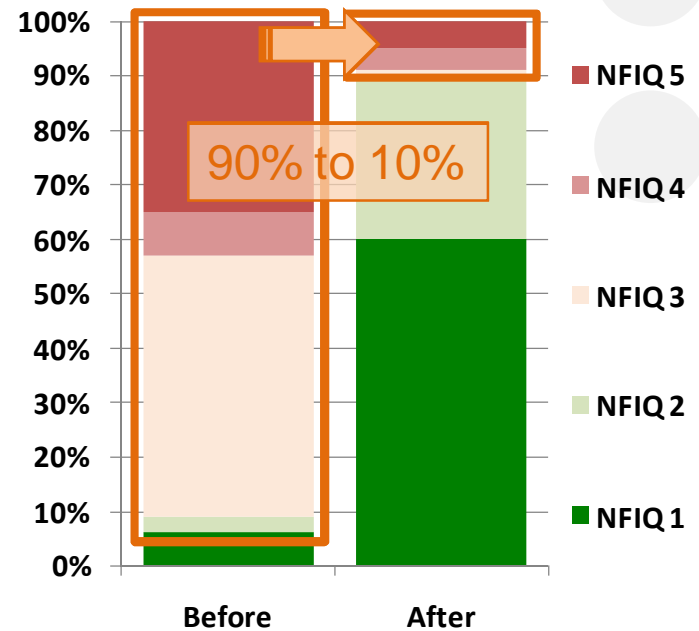
- Innovative technology uses a new model based statistical approach to overcome many of these problems.
- New approach features;
 - Intrinsic mathematical representation of the ridge flow structure.
 - Models low contrast and smudged images
 - Specific model for semi-permanent features e.g. scars or scratches
 - Image normalization intrinsically removes linear and elastic deformation.
 - Produces “idealized” fingerprint images that preserve distinctive features
- Designed for standard multi-core processors, highly scalable and increases accuracy particularly when the proportion of low quality fingerprints is high.



Evaluation and Benchmarks

- NFIQ tests before and after show the improvement produced by the technology.

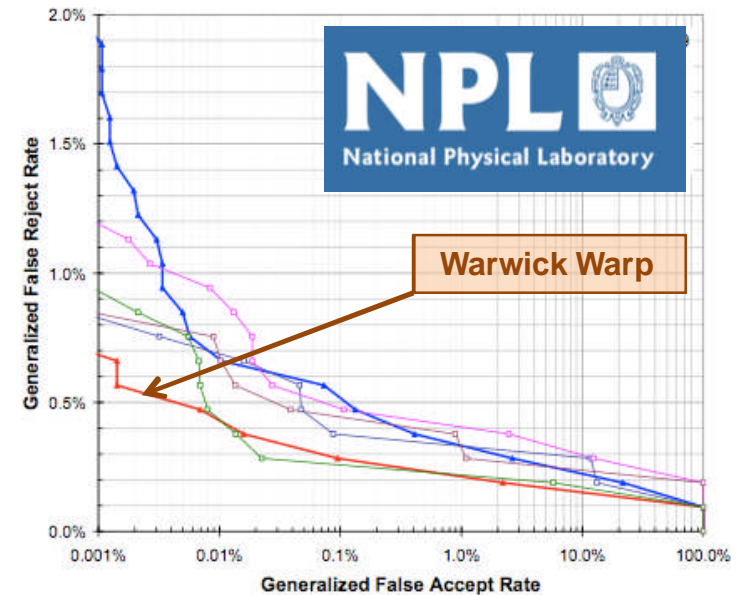
NFIQ Quality Score Before and After WW Processing NIST SD29



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- NPL (National Physical Laboratory, UK) independent benchmark – WW technology equals market leaders.

NPL Benchmark Against Leading AFIS Vendors



Evaluation and Benchmarks

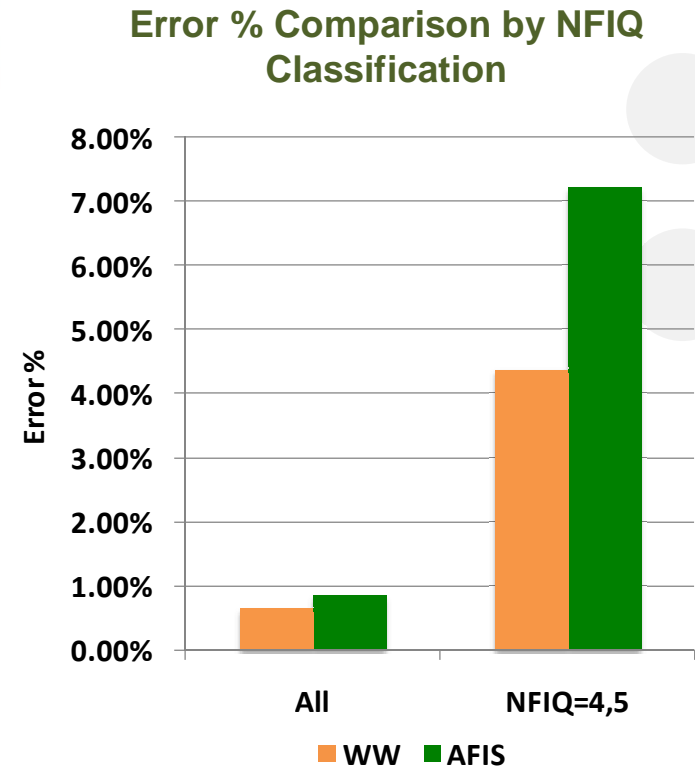
- NFIQ tests before and after show the improvement produced by the technology.
- NPL (National Physical Laboratory, UK) independent benchmark – WW technology equals market leaders.
- NIST (National Institute for Science and Technology, US) independent benchmark places WW technology in top tier.

NIST Benchmark Against Leading AFIS Vendors (0.1% FAR)

NIST		
Rank	Company	AVG
1	Cogent	0.999375
2	NEC	0.998825
3	Warwick Warp	0.998775
4	BioKey	0.998675
5	Tiger IT	0.998625
6	L1	0.99845
7	Sagem	0.998275
8	Motorola	0.997875
9	Neurotech	0.997875
10	Sonateq	0.997775
11	Identix	0.997475
12	Thales	0.996400
13	Biolink	0.993575
14	Eastern Golden Finger	0.987725
15	USFIS	0.924025

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- Independent commercial evaluations – performance gap widens as proportion of low quality fingerprints increases.



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- Independent commercial evaluations – performance gap widens as proportion of low quality fingerprints increases.
- Evaluation by construction sites shows fingerprints now a viable biometric for manual workforce management applications.



Products and Licensing

Warwick Warps' business is the development and licensing of software technology for biometrics applications.

 <p>Commercial SDK</p> <p>Designed for small to medium scaled commercial fingerprint matching applications where the highest levels of accuracy are required.</p>	 <p>Enrollment SDK</p> <p>ANSI/NIST compliant high performance quality checking, segmentation, packaging and sequence checking services for flat and rolled livescan capture systems.</p>
 <p>Latent Preprocessor</p> <p>Designed for law enforcement to enhance low-quality crime scene marks and assist expert identification of minutiae and other features of interest.</p>	 <p>AFIS SDK</p> <p>Designed for large scale AFIS applications where the highest levels of accuracy and speed are required.</p>
 <p>BioLog</p> <p>Designed for law enforcement applications requiring automated matching of crime scene marks. Includes preprocessing, enrollment and matching.</p>	 <p>Latent SDK</p> <p>Designed for law enforcement applications requiring automated matching of crime scene marks. Includes preprocessing, enrollment and matching.</p>

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Summary

- New innovative technical approach – accurate, fast and highly scalable.
- Top tier AFIS accuracy performance - benchmarked by NPL and NIST
- Market leading matching accuracy of low quality fingerprints.
- Proven in real world low-quality fingerprint applications.
- New technology at the start of it's performance growth curve.

