

Quality Values for Face Recognition

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- Assessment of Approaches to Quality Scores
- Approach to Quality Scoring
- Experimental Results
- Conclusion



Traditional Approaches to Quality Scores

- traditional approach for quality assessment of images is strongly driven by photographic history:
 - Brightness
 - Contrast
 -
- using digital media leads to a second set of requirements
 - Image resolution
 - Compression (ratio, PSNR)
 -
- adding context, i.e. talking about Facial Images,
 - Size of face
 - Contrast of face
 - Resolution of face
 -
- prominent example
 - ICAQ requirements, i.e. requirements of ISO/IEC 19794-5 and ANSI-385

- Working draft of ISO/IEC 29794-1 defines different levels of processing
 - Source -> character
 - Image based sample -> fidelity
 - Processed sample -> fidelity
 - Feature-based -> fidelity
- For details refer to David Benini's talk on "Biometric Quality Standards"

- For modality “Finger” use of information of all levels is state of the art
 - Most quality measurements are minutiae based
 - How do Spectral based approaches fit in this scheme?
- For modality “Face” there is no agreement on a common definition of features
 - PCA/ICA
 - Wavelets
 - Local Features
 - Filter Responses of any kind of filters
- Face Quality approaches tend to avoid feature based quality values

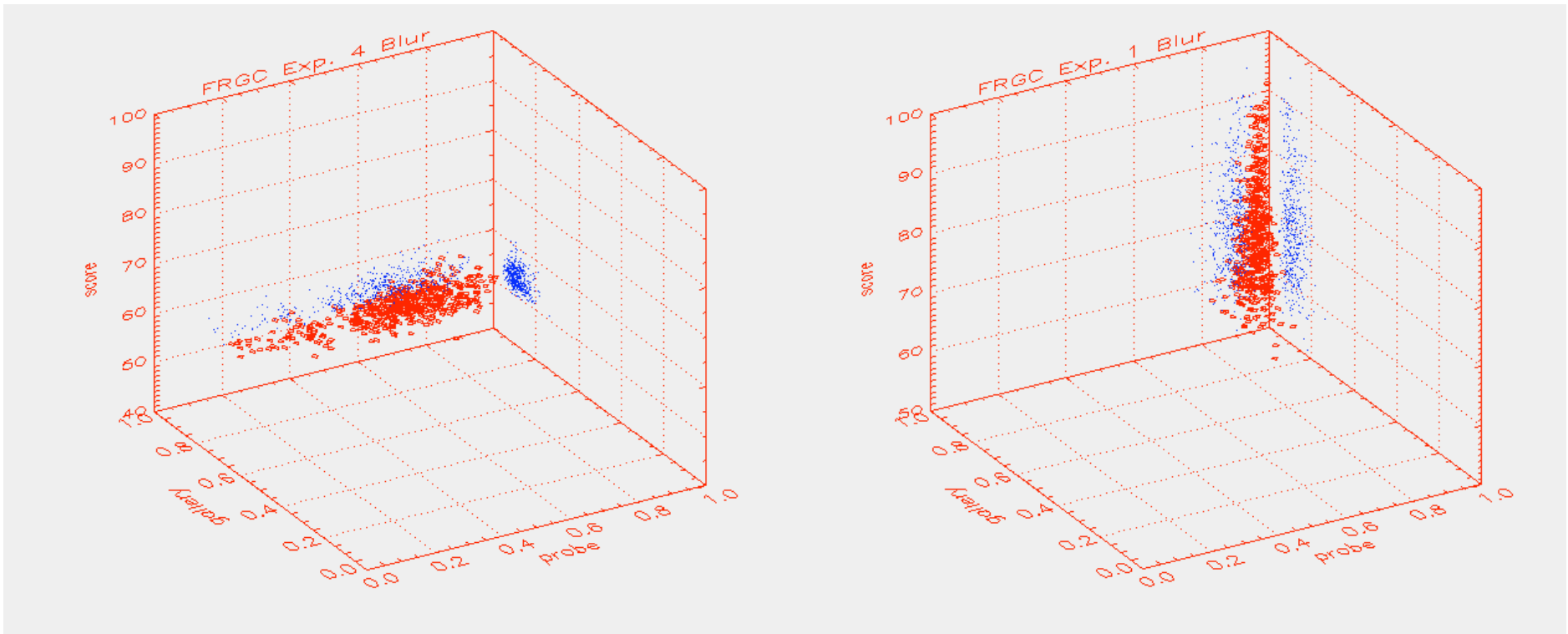
Features are designed for

- **Data compression**
 - compression that preserves discriminative power
 - has potential to serve as a foundation for a well defined quality score (+)
- **Intra class generalization**
 - images of the same individual should lead to similar features despite different image properties (eliminates irrelevance)
 - has potential to serve as a foundation for a well defined quality score (+)
- **Cross class discrimination**
 - images of different individuals should lead to dissimilar features despite similar image properties
 - risky for a quality score, since quality score should be independent from the individual (-)

- Up to date Face Recognition Technologies up to a large extent compensate for photographic effects
 - > extreme non linear relationship between score and photographic quality scores
- Quality should be related to prediction of matching accuracy than photographic characteristics of an image (except for manual interaction)
 - > matching is a function of two images resulting in a score, that is related to probabilities

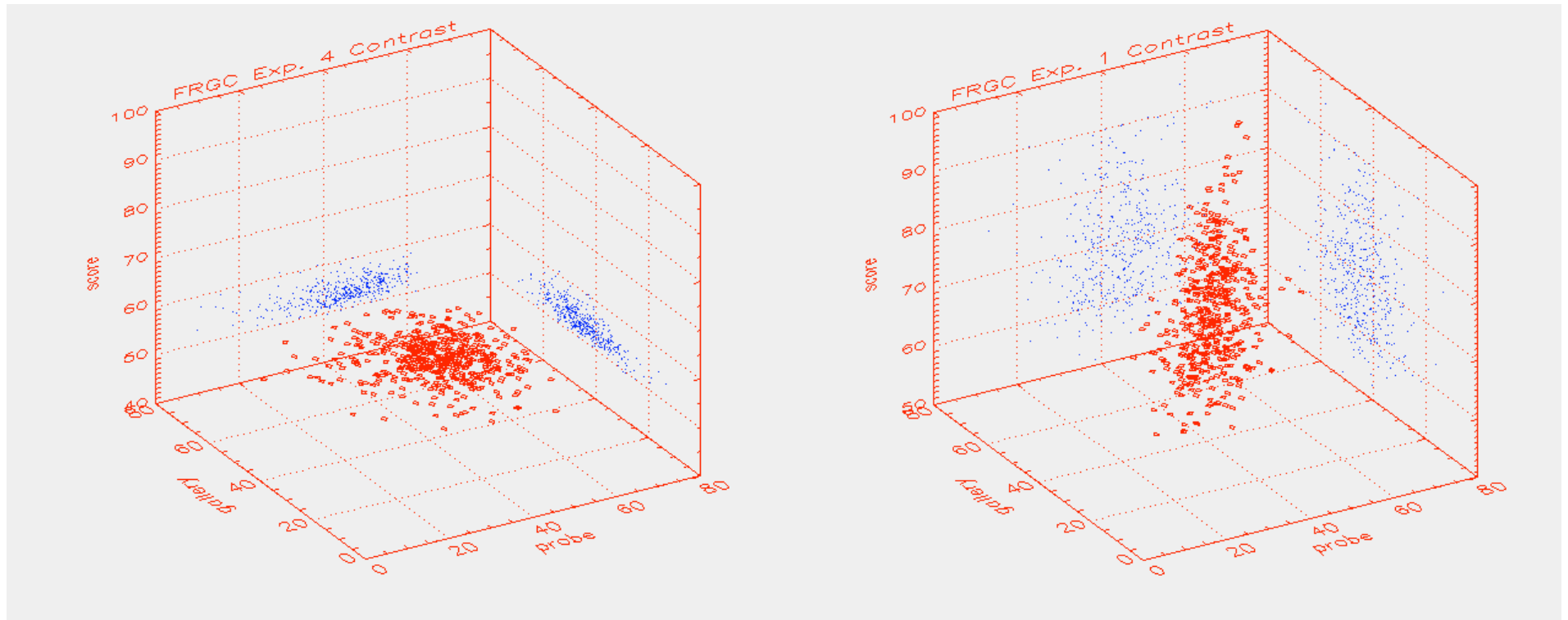
- Analyze correlation of single quality scores on matching score
- Analyze accuracy of score prediction based on multiple quality scores

Experimental Results Sharpness



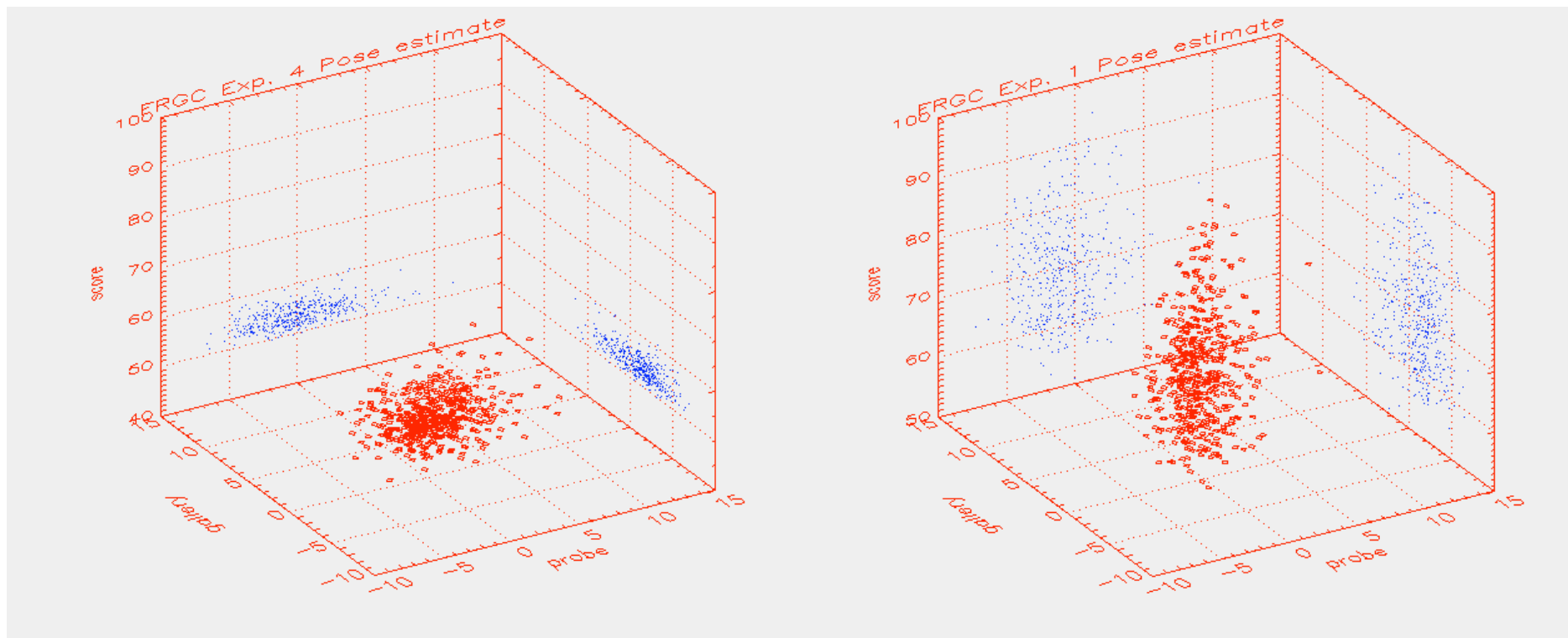
Experimental Results

Contrast on Face



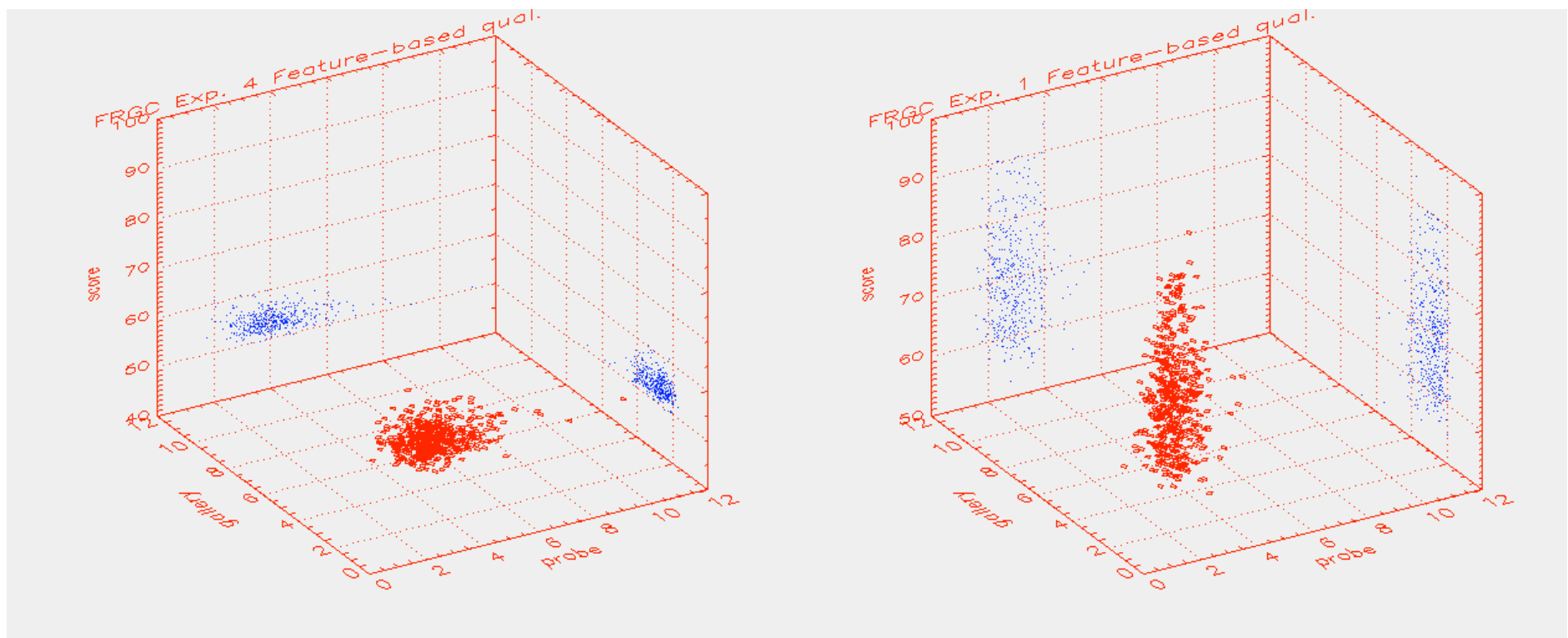
Experimental Results

Pose



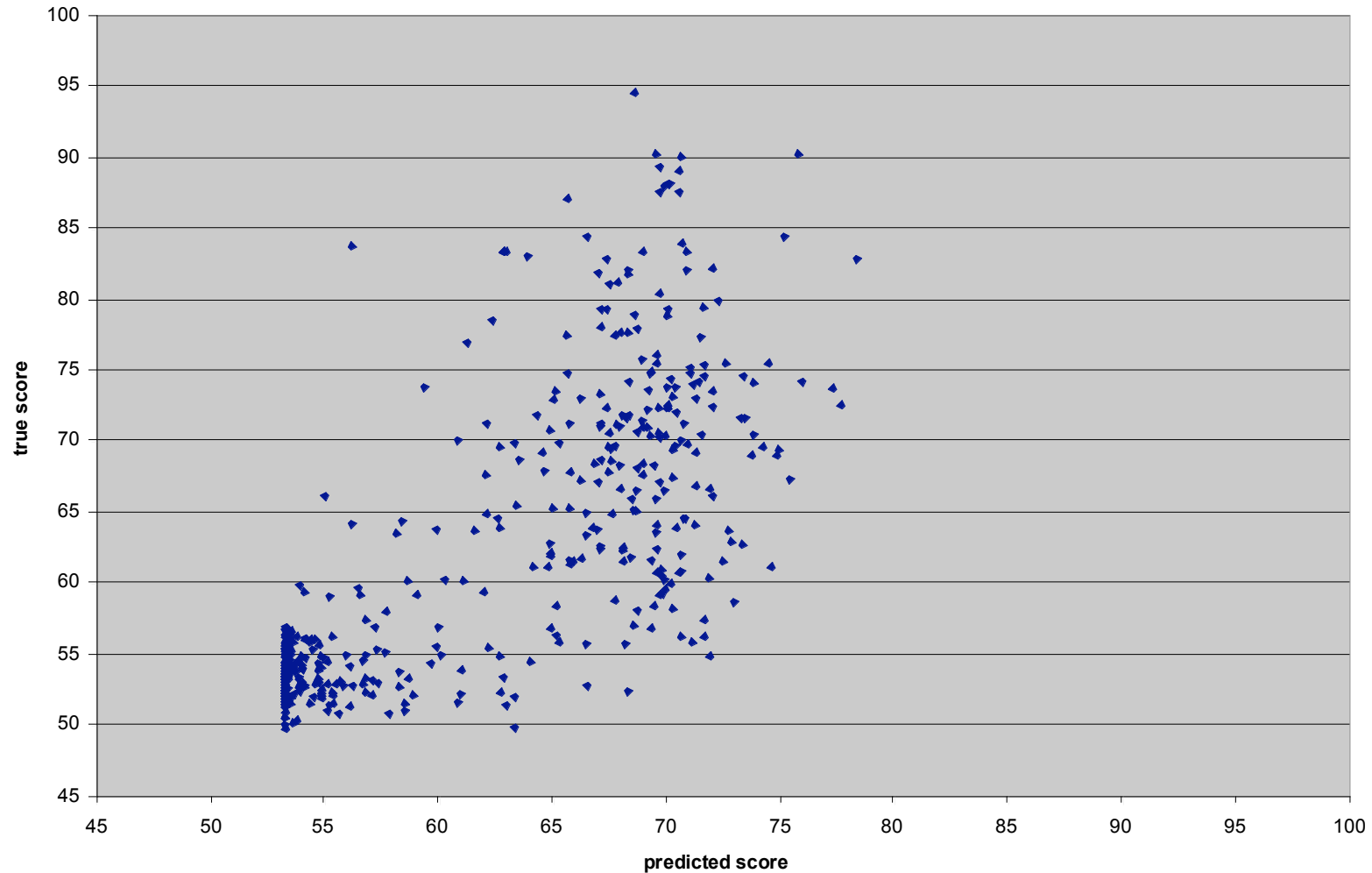
Experimental Results

Feature Based Quality Score



Experimental Results

Neural Net Prediction Of Genuine Scores Based On
Pose Estimate, Blur, Face Classifier Output



- Low quality typically is a consequence of multiple limitations
- Up to date FR systems are trained to be invariant to changes
 - making analysis of simple quality measures difficult
- Estimation of performance based on combining photographic and feature level scores seems to be promising approach

Thank you for your attention
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