Quality Values for Face Recognition
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Outline

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

Traditional Approaches to Quality Scores

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- 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

  ICAO requirements, i.e. requirements of ISO/IEC 19794-5 and ANSI-385

Relation to Standards

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- 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"

Comparison Face / Finger

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- 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

Feature Based Quality Scores

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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 (-)

Assessment of Traditional Approaches

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- 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

Analyzing Quality Score Candidates

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

Experimental Results
Sharpness

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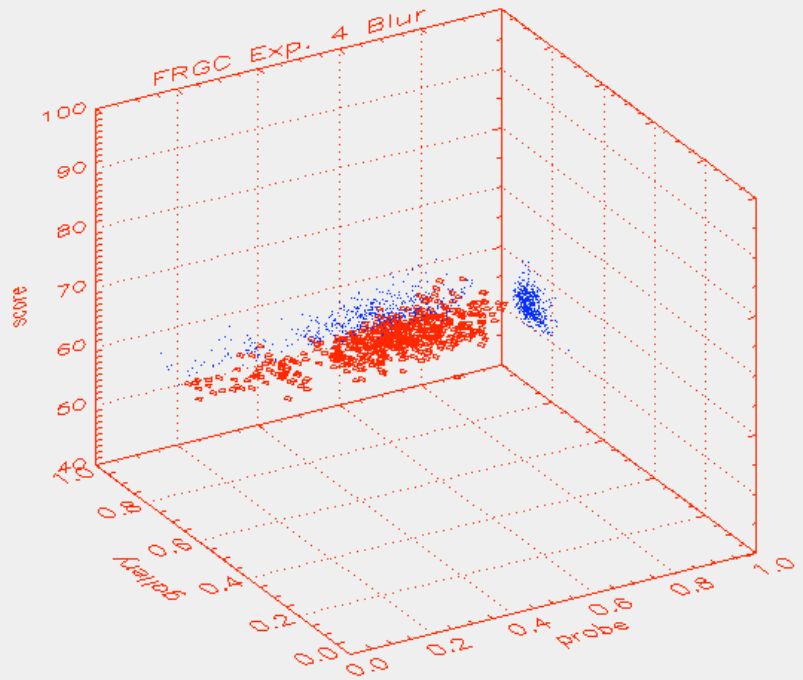

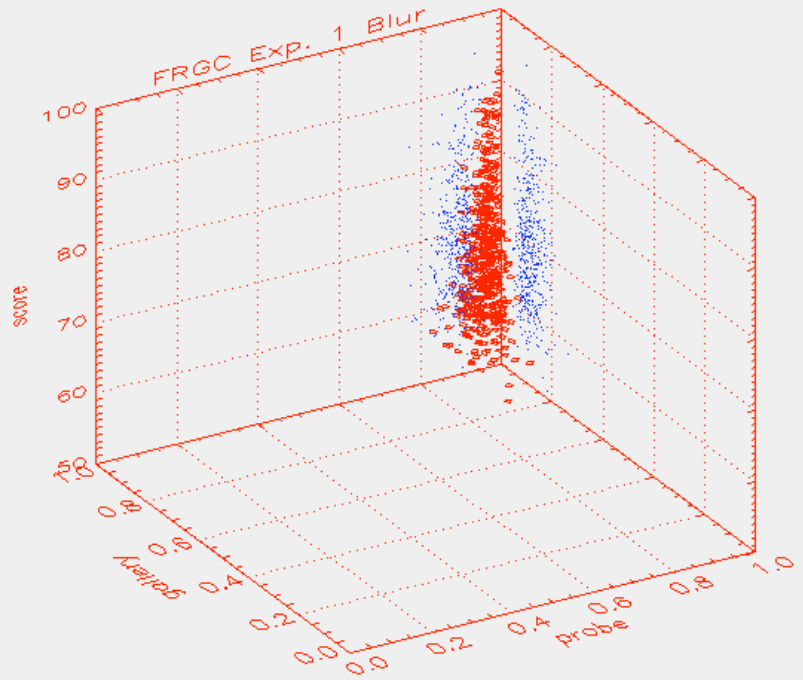

Experimental Results
Contrast on Face

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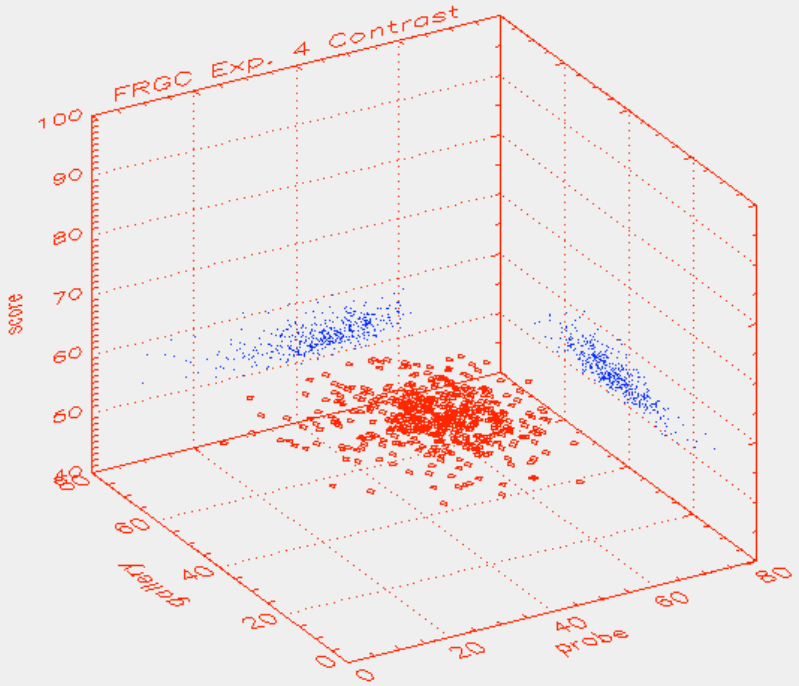
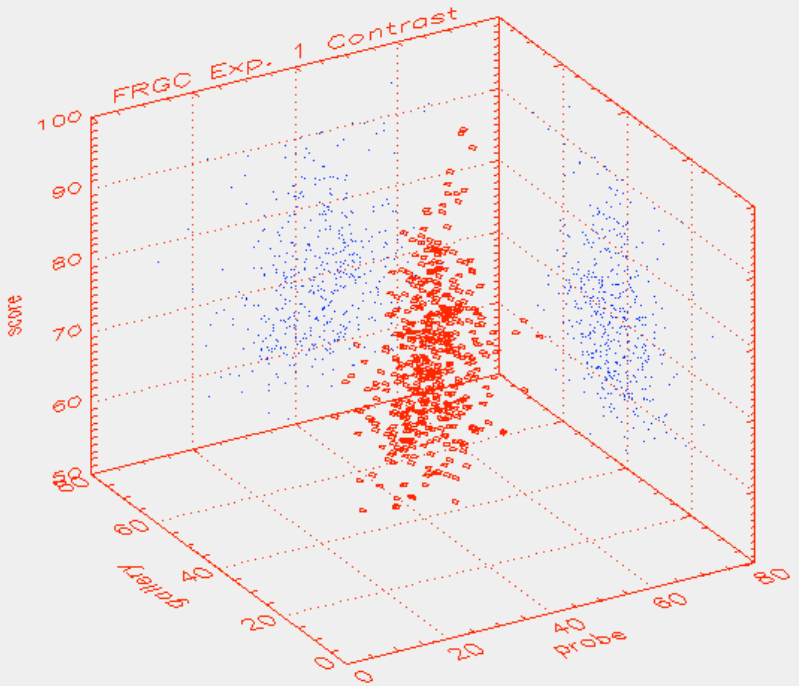
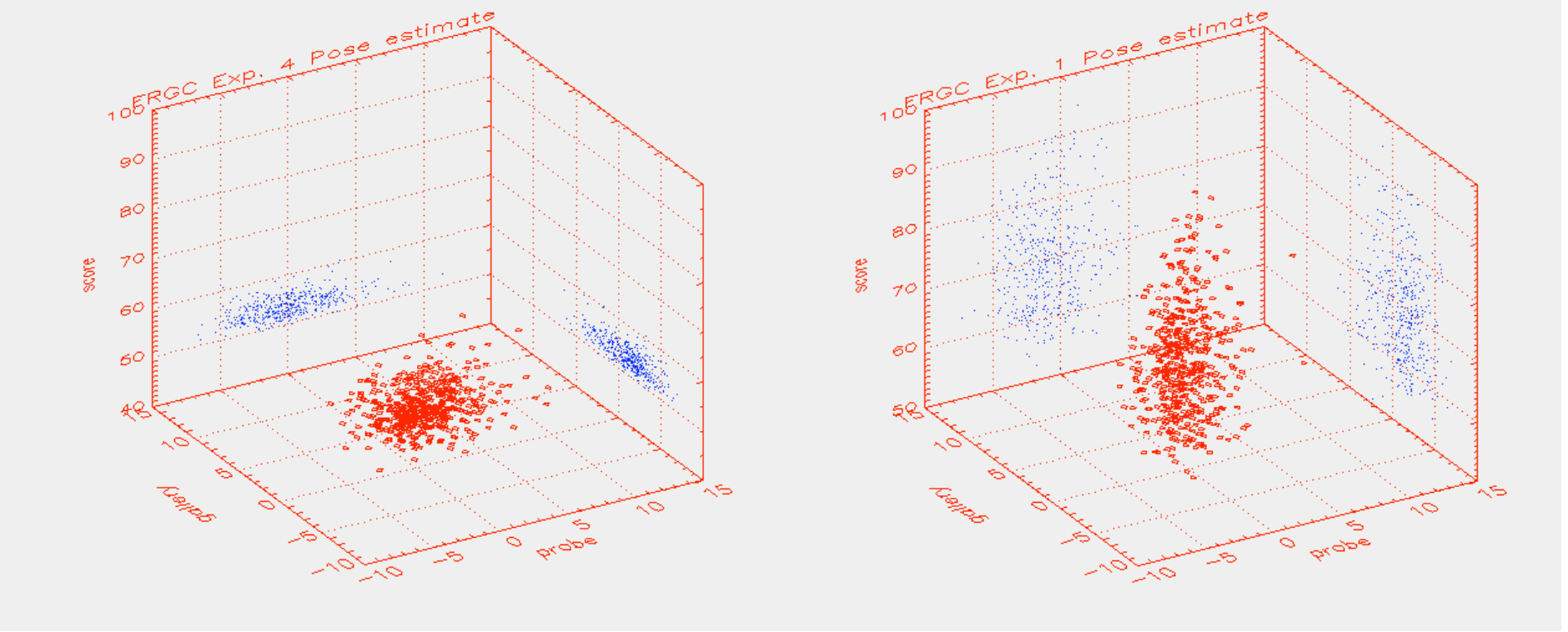




Experimental Results
Pose



Experimental Results
Feature Based Quality Score

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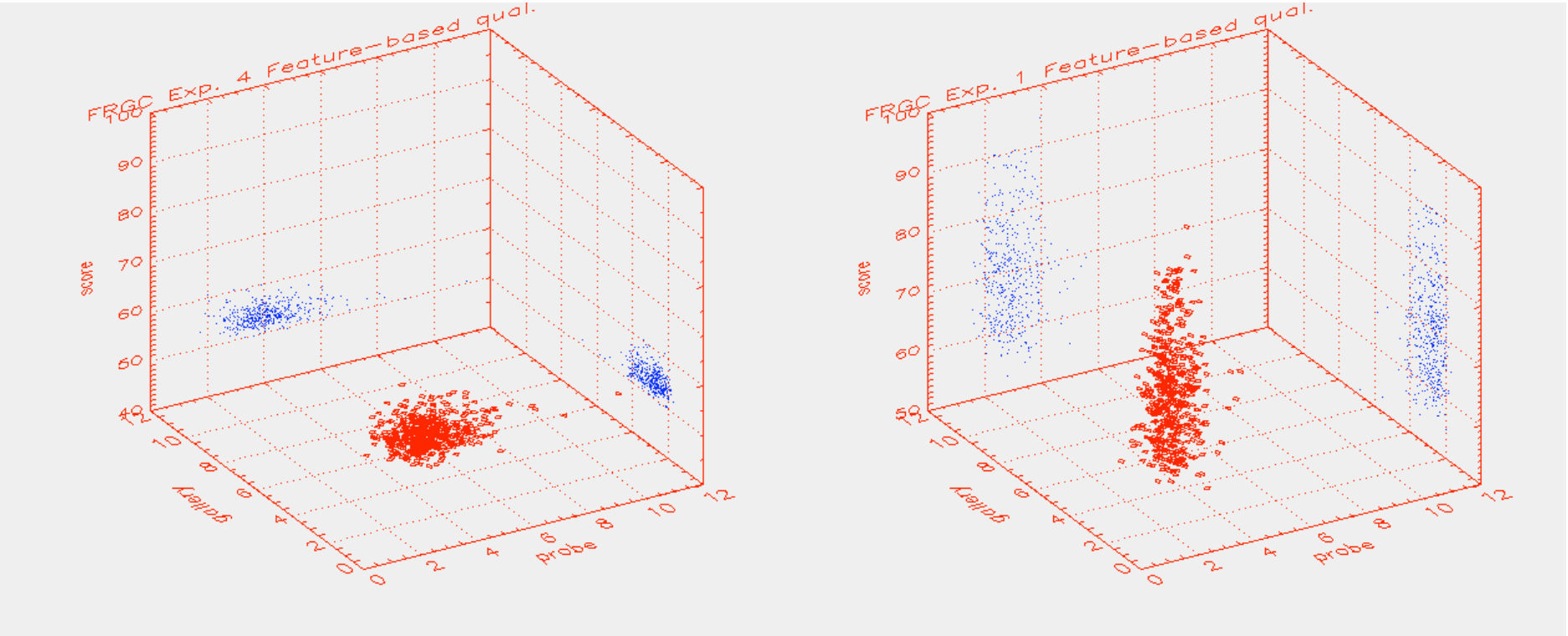

Experimental Results

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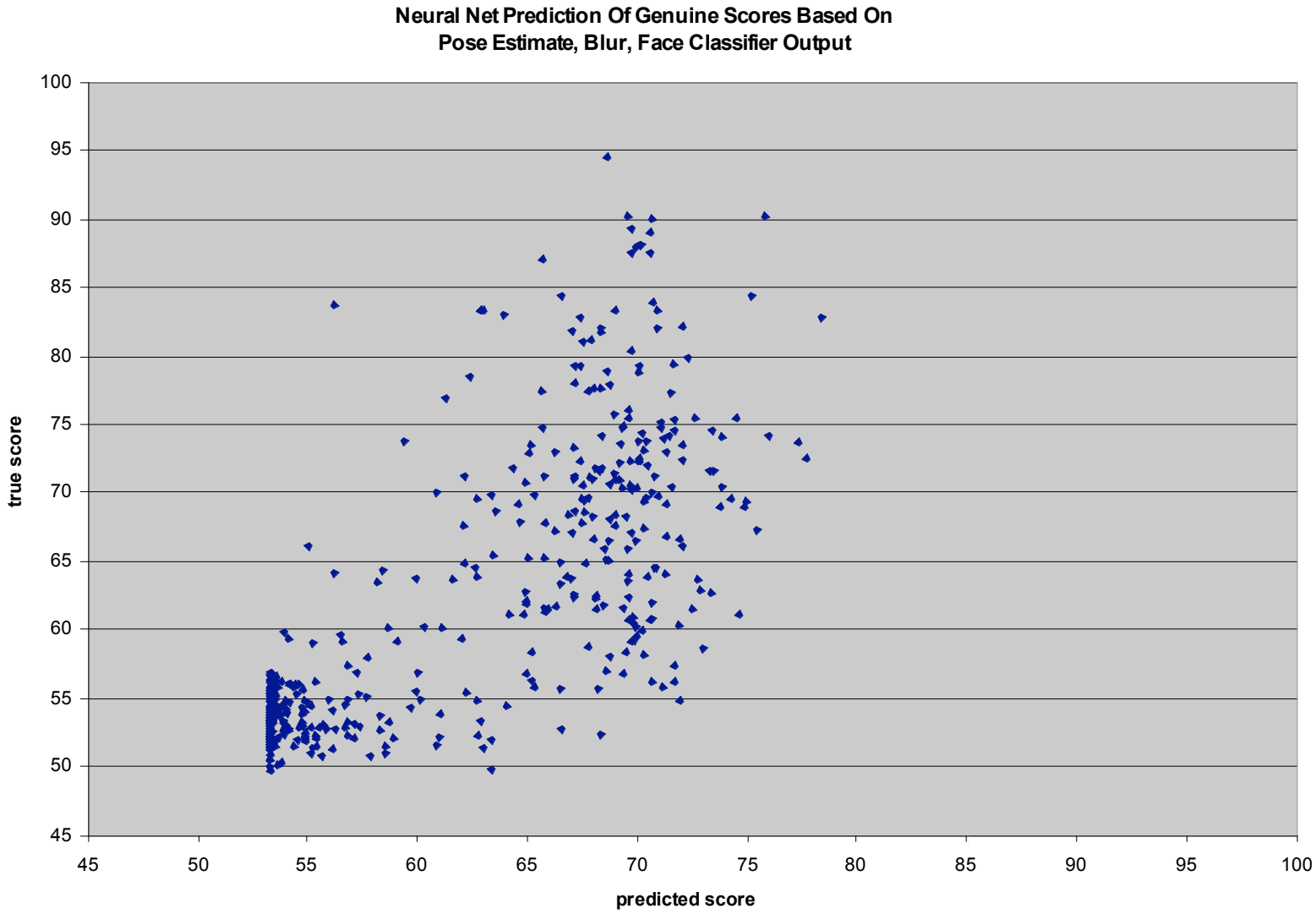

Conclusions

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- 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 combing photographic and feature level scores seems to be promising approach

Thank you for your attention

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