Mobile Biometrics: Towards A Comprehensive Evaluation Methodology

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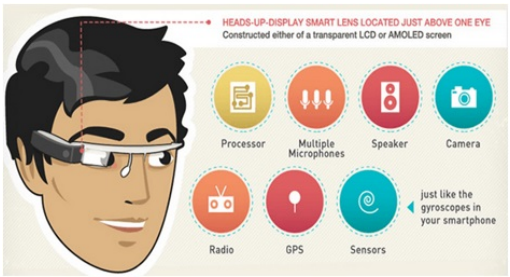
Outline

- **Motivation**
- **Problem statement**
- **Guidelines/Recommendations**
- **Conclusion**

New Generation Devices



[1] https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2015/cmr-uk-2015

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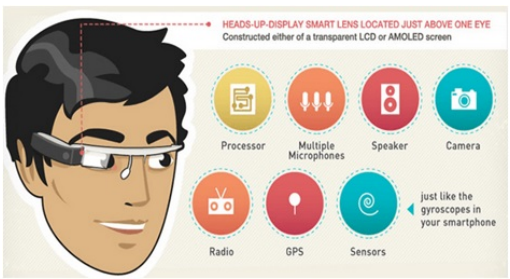

- **The UK is now a smartphone society**[1]

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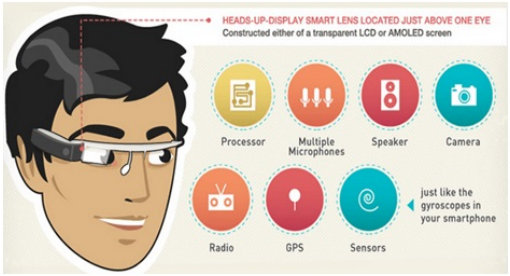

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New generation devices: personal, connected and powerful!

- **Beyond classical communication**
  - **Taking pictures & making movies and sharing with others**
  - **Social Networking**
    - **Facebook, Viber, whatsApp, Skype, Twitter, etc.**
  - **Online Transactions**
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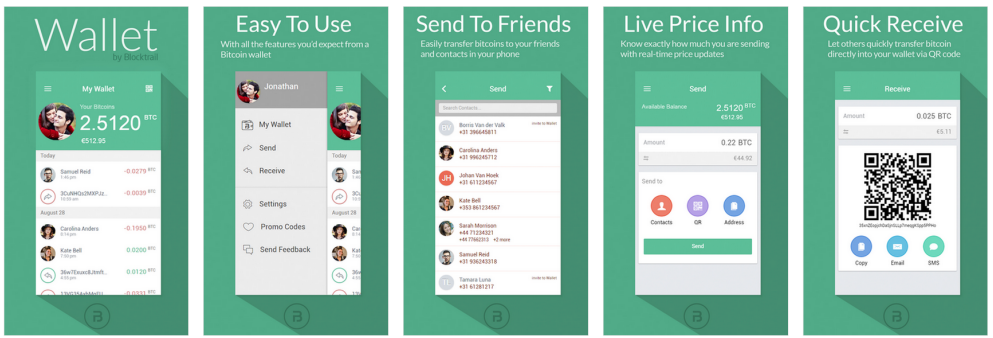

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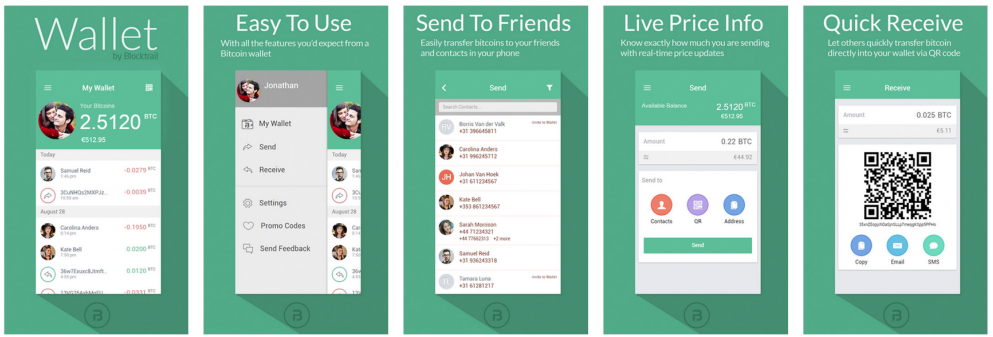

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- **All of these apps generate and store very personal user information which needs to be protected**

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  - **Being able to prove a user is who she claims to be**

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  - **Long, short & frequent sessions**
  - **Repeatable (as and when required)**
  - **Risk-based and adaptive**
  - **Continuous**

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- Research has been diverted to design new acceptable & secure metaphors for user authentication.
- Evaluation is mainly based on security (under zero-effort) not on the other operational issues, i.e., usability, robustness against attacks, and computational overhead.
- **We present a set of guidelines for designing, implementation, and evaluating newer user authentication methods for a positive impact on future technological developments.**

Guidelines!

Data Collection Protocol

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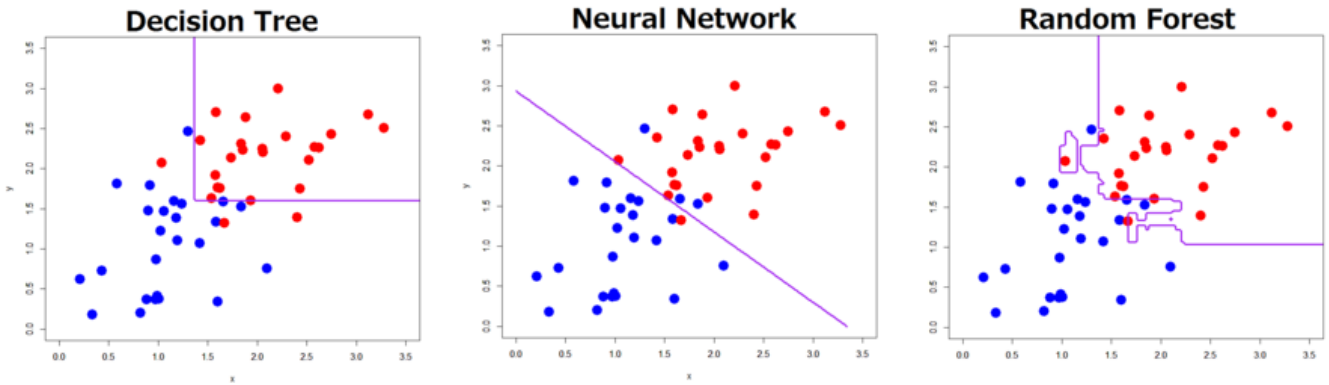
- Data should be collected anonymously or their data privacy should be ensured.
- **We recommend to collect data in a natural way, i.e., data should be collected in multiple sessions so that the participant should not be able to memorize the behavior.**

Classification Protocol

- **The mobile user authentication problem essentially is a one-class classification problem, it is thus unreasonable to formulate mobile user authentication as the binary class classification problem.**



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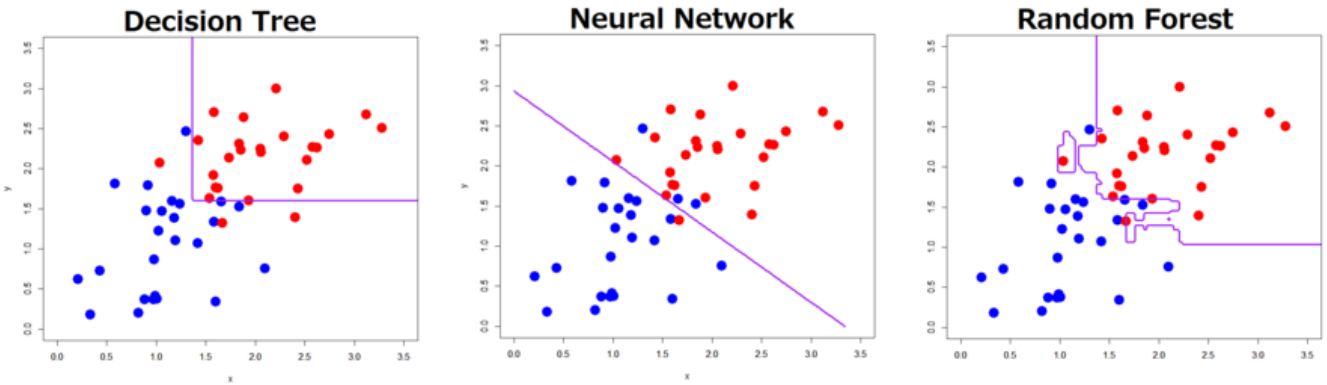

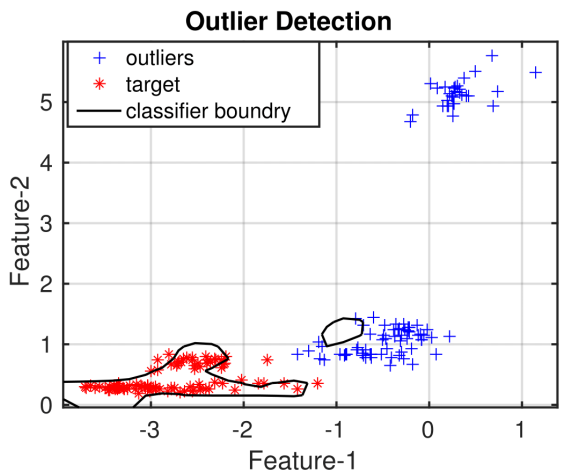

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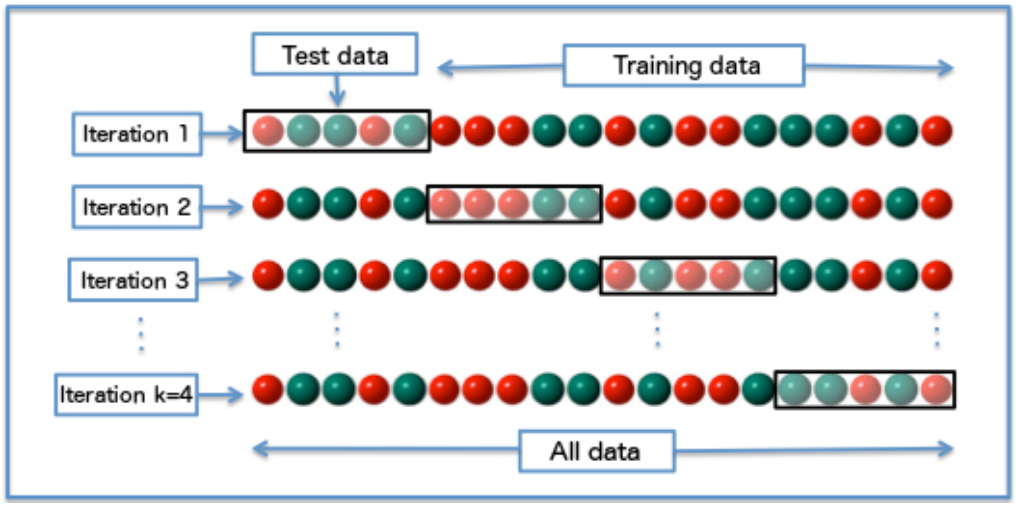

Success Metric

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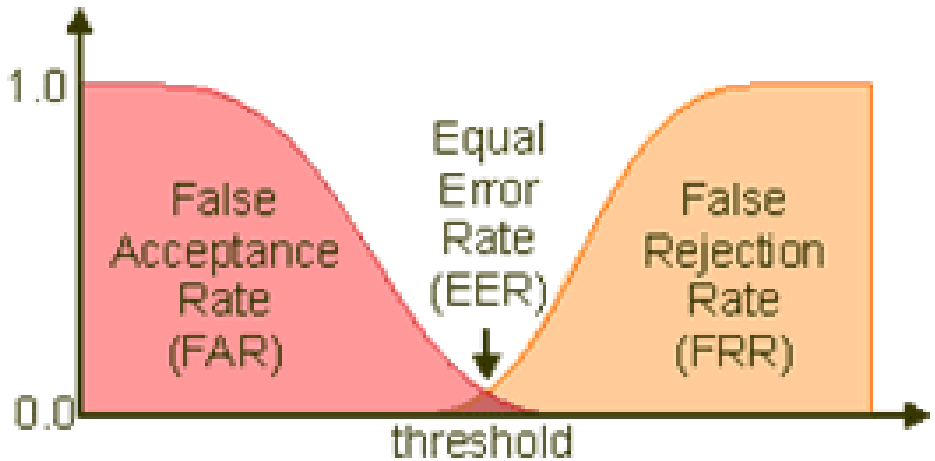
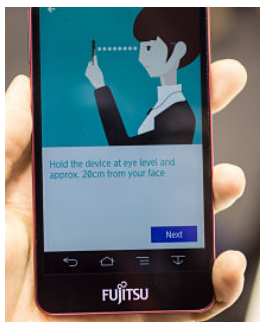
- **Failure to Acquire Rate (FTAR)**
- **Failure to Enroll Rate (FTER)**



Usability Study

1. **Sample Acquisition Time**
   - **Biometric researchers should minimize the required sample acquisition time in order to increase the acceptability of their proposed scheme.**

Figure: Time Consuming (15-20s)[3]



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2. **Classifier's Training/Testing Times**
   - **Larger testing time could end up in annoying the user and won't get the wide user acceptability.**

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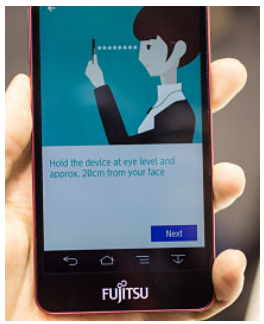

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Usability Study (2)

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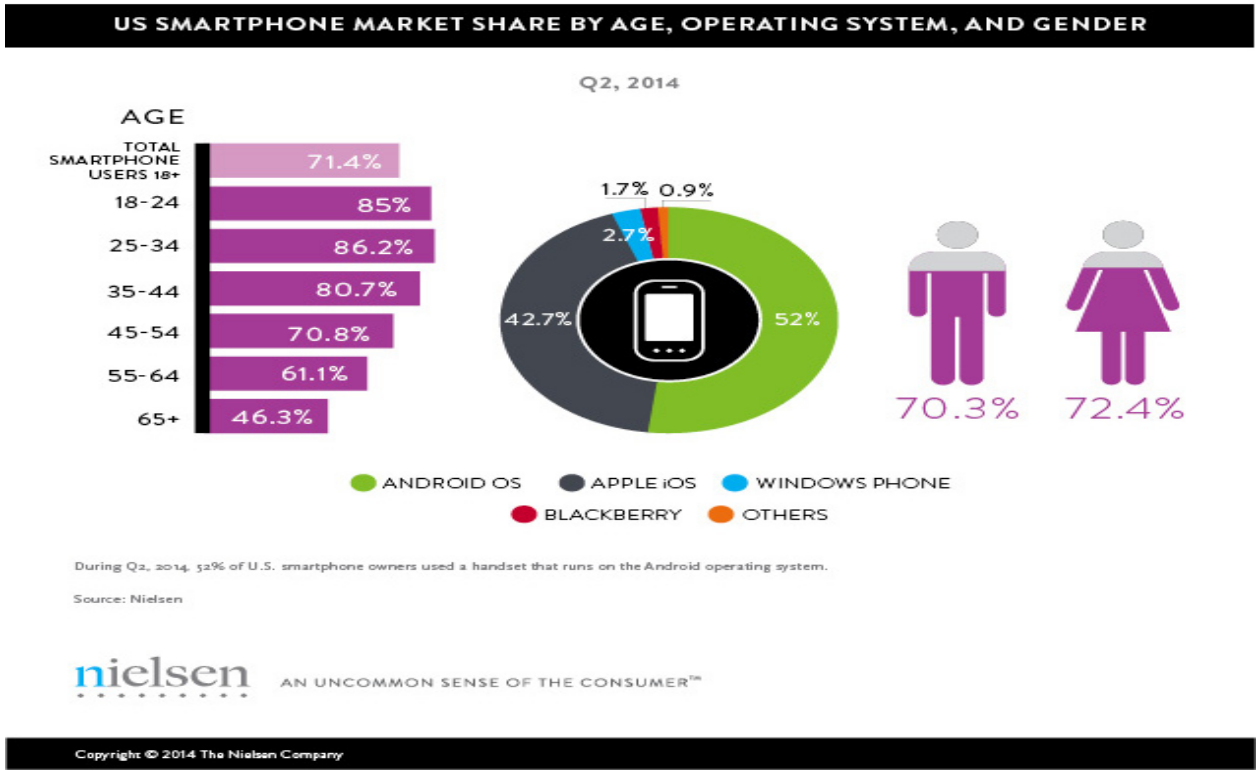

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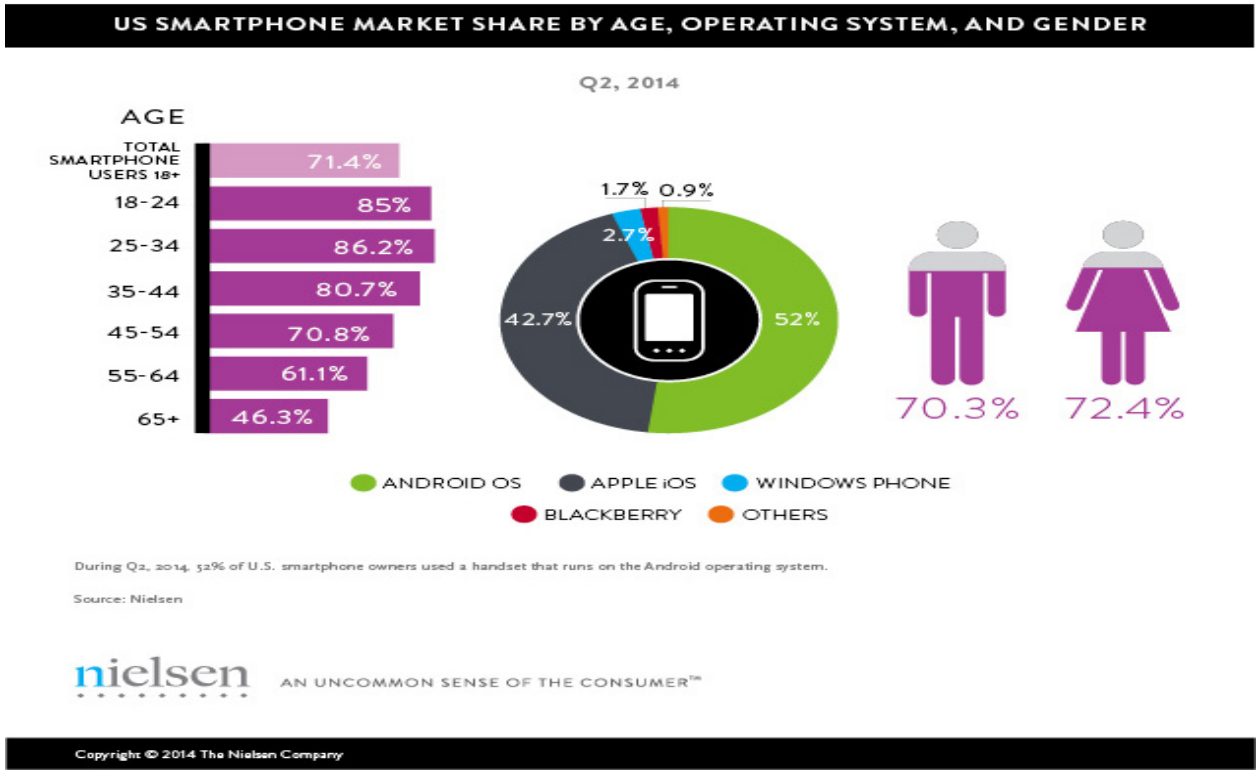

Usability Study (2)

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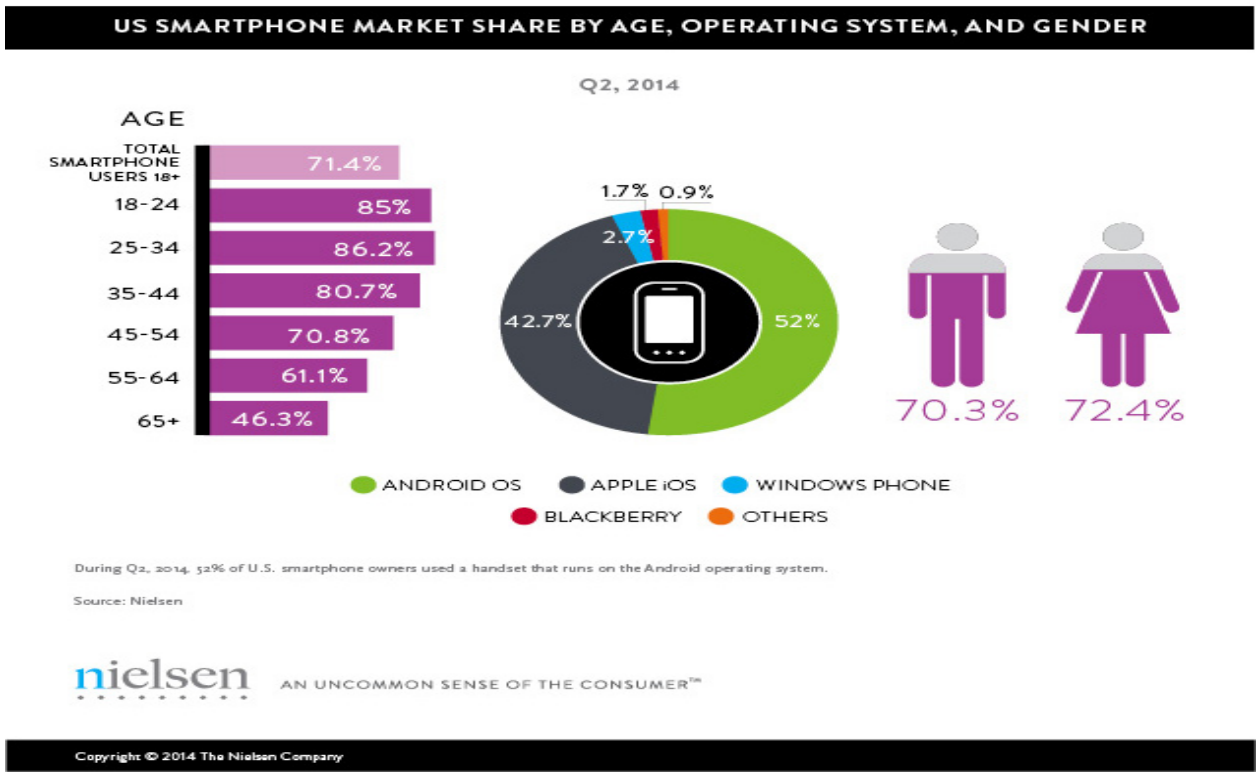
2. Applicability in different situations
   - **The newly proposed authentication scheme needs to be evaluated in multiple common activities in order to obtain a clear picture of their final accuracy.**



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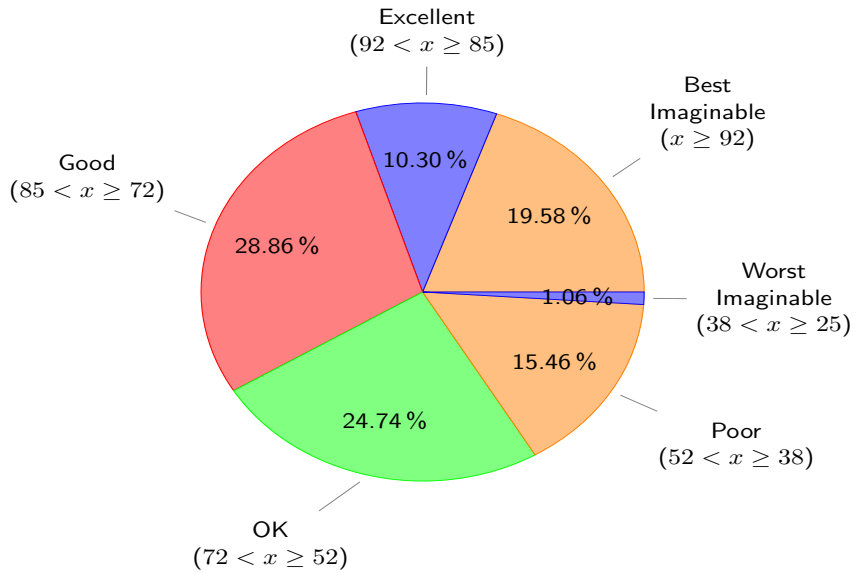
2. **Software Usability Scale (SUS)**
   - **Research proposing new mobile biometric should also include initial usability evaluation to get an impression of user acceptability of their scheme.**



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3. **Some Bench-Mark Applications**
   - **AnTuTu**
   - **GreekBench**
   - **Quadrant Standard**

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3. **Engineered Attacks**
   - **We admit that executing this type of attack is a bit time taking, cumbersome, and tricky, but the claims regarding the robustness of their proposed schemes should only be made after such evaluation.**

Conclusions

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- Guidelines
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- **Objective**
  - **In order to maximize the impact and usability of the proposed schemes, it becomes extremely important to design, develop and evaluate, comprehensively, the upcoming schemes diverse criterion.**

Thank You!