

A Preliminary Investigation into a Deep Learning Implementation for Hand Tracking on Mobile Devices

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Introduction

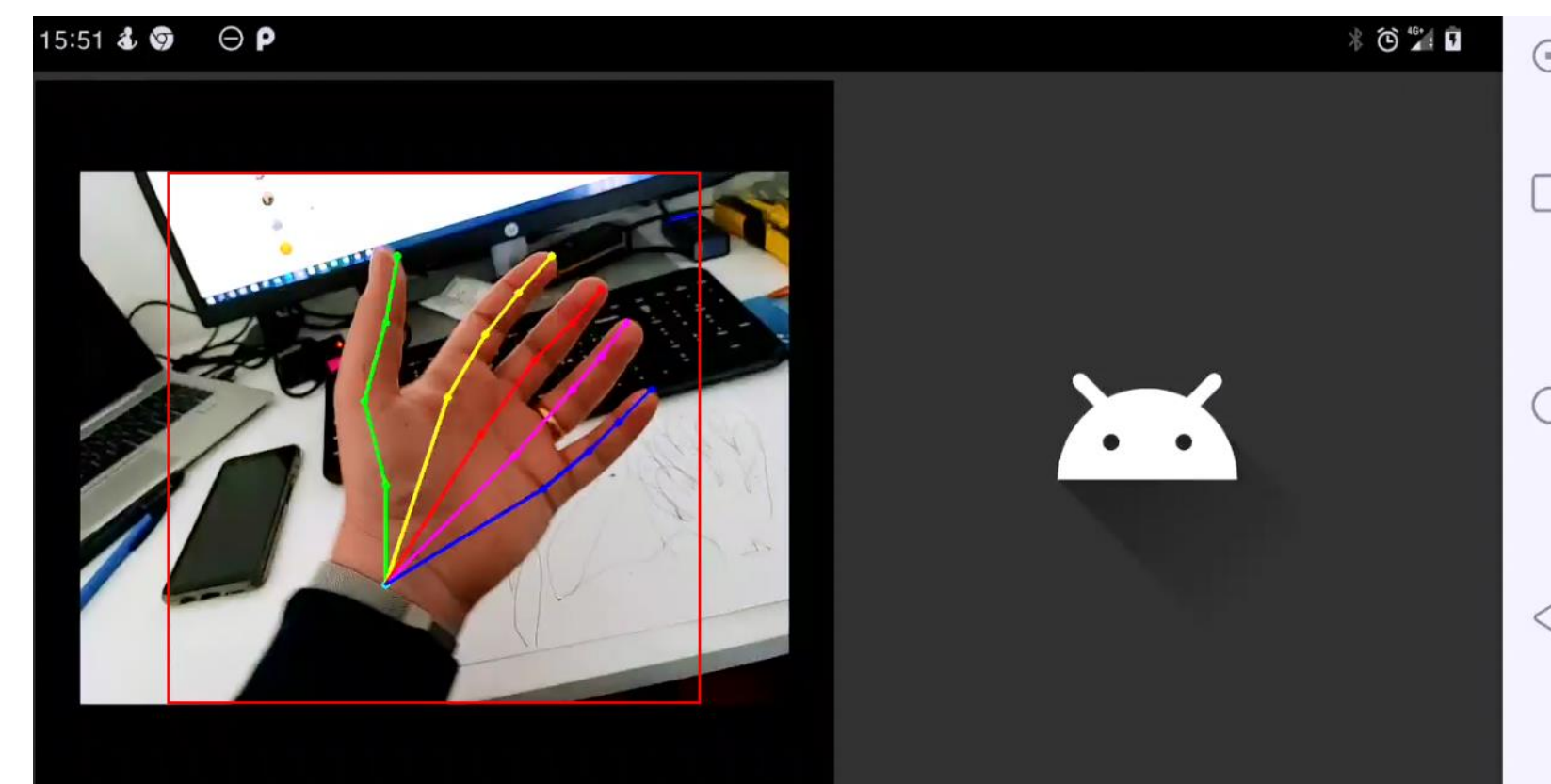
Hand tracking is a useful component for VR, AR, HCI, robotics, gesture recognition, and sign language understanding applications. Traditionally, additional data or multiple/depth cameras are used.

Challenges

- Occlusions and similarities among fingers
- Various hand poses and gestures
- Complex background and lighting
- Runtime and resource constraints

Goal

We propose a **mobile app** for **2D hand tracking** from **RGB** images captured by the **smartphone camera** and processed by a **deep neural network**. **No additional data** are needed.



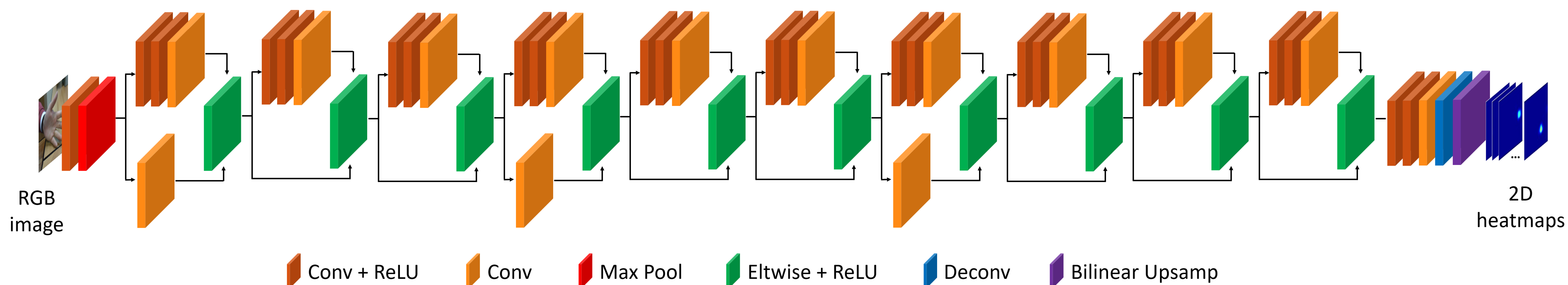
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Our idea

Our network is based on the 2D branch of the first part of RegNet baseline model, a real-time joints regressor from RGB images. It is not designed specifically for mobile. We found a **compromise between performance and computational time**.



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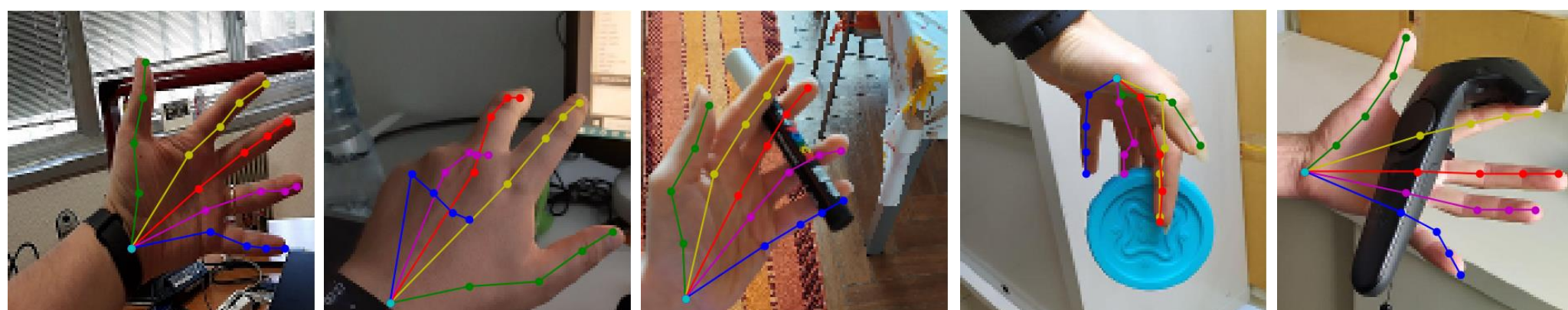
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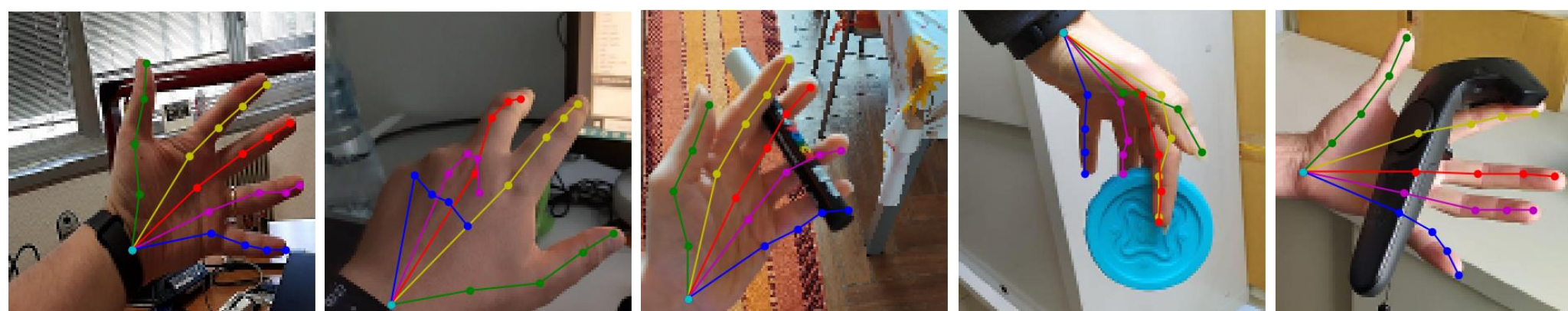
Comparison with the baseline model

Our network achieved **qualitative comparable results** in most cases and **0.04 seconds less** per frame prediction on average (i5-8th gen CPU), resulting in **significant savings in computation time**.

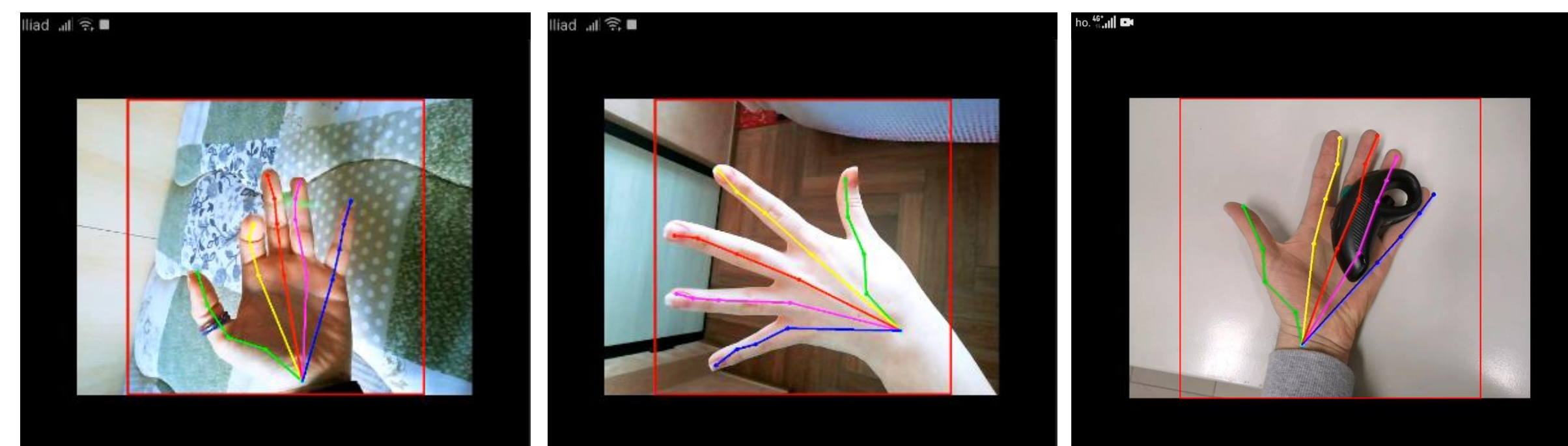
Our



Baseline



Our Hand Tracking App Results



Conclusions

We achieved an **interactive hand tracking** level on most devices and promising results in the case of **variable brightness and background** and **small occlusions**.