LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

FAKULTÄT FÜR MATHEMATIK, INFORMATIK UND STATISTIK
INSTITUT FÜR INFORMATIK
ARBEITSGRUPPEN MEDIENINFORMATIK UND
MENSCH-MASCHINE-INTERAKTION

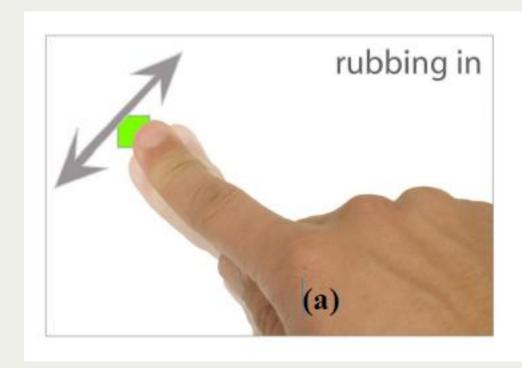# "Single touch zoom gestures on a mobile device"

Abschlussvortrag Bachelorarbeit
Neal Bürger

Related Work

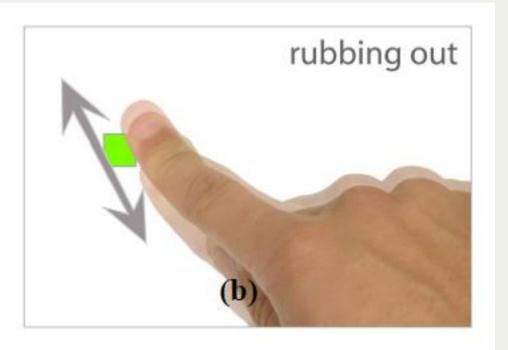# The Automatic Recognition of Gestures

- **Specifiable**: Either by example or specification by description.

- **Accurate Recognition**: It is desired that the user input is evaluated as accurate as possible so the device can immediately react to the input.

- **Efficient Recognition**: Gestures should be evaluated and recognized as efficient as possible; this in turn allows real-time recognition and immediate feedback.

- **Efficient training**: An ideal system could learn over time how a user inputs gestures and adapt its recognition routines to minimize inaccurate recognitions.

- **Device utilization**: Depending on the sensor frame and other physical factors, each interaction surface has its own characteristics that have to be taken into account. [1]

Rubbing and Tapping for Precise and Rapid Selection on Touch-Screen Displays

[2]

Interaction Design

One touch moves the image

User operates the device with his thumb

Immediate Feedback

No Visual Guides

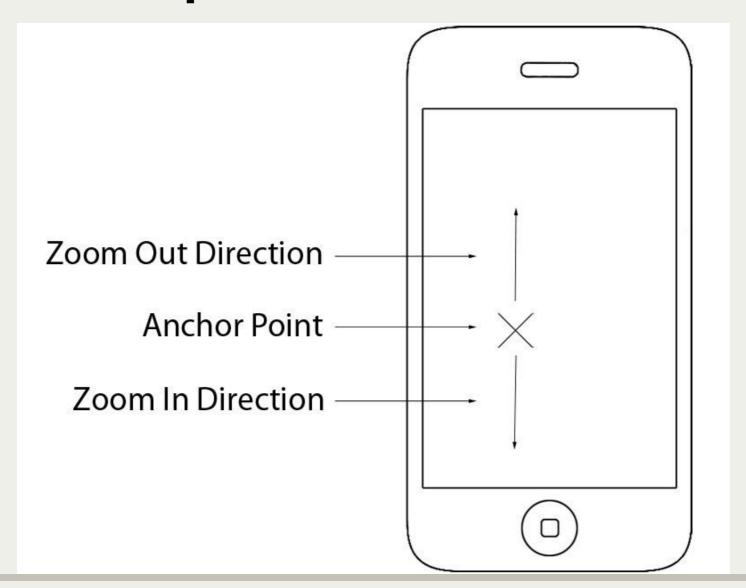# Core principals of zoom gestures

- Begin/End-interaction of zooming (via tapping, touch, etc.)

- The actual interaction gesture

- Positioning of the anchorpoint

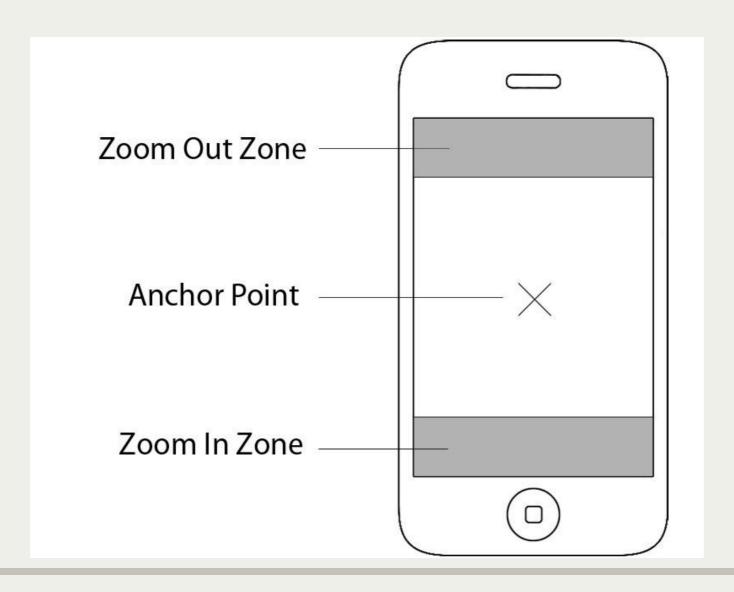- „Zoom in" speed is equivalent to „zoom out"
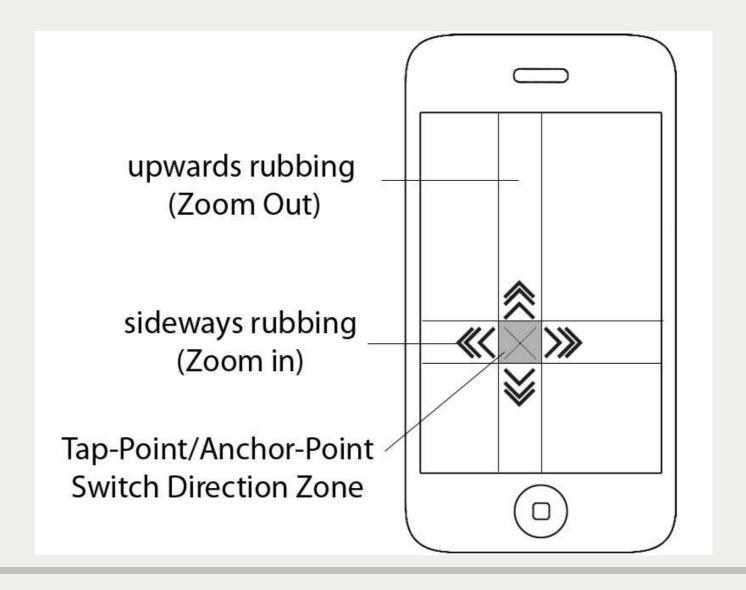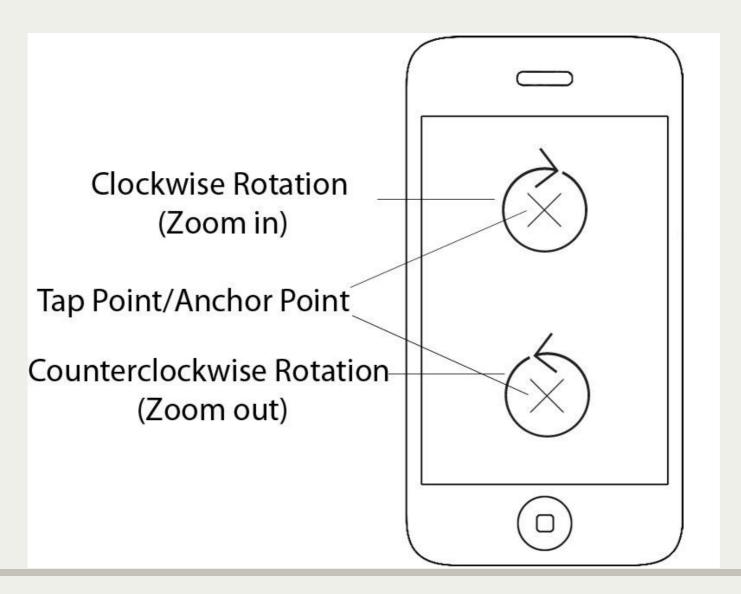
"Tap – Direction"

Zoom Out Direction →
Anchor Point → ✕
Zoom In Direction →

" Zones "

Zoom Out Zone

Anchor Point

Zoom In Zone

" Rubbing "

upwards rubbing
(Zoom Out)

sideways rubbing
(Zoom in)

Tap-Point/Anchor-Point
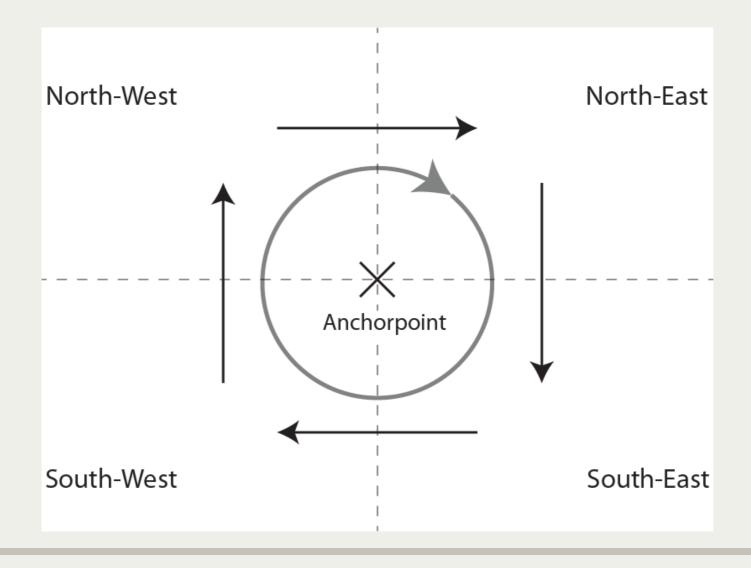Switch Direction Zone

"Circular"

" Circular " Implementation

User study

- Fifteen participants (10 female, 5 male, aged 21 to 26)

- Students from various fields, (medicine, chemical engineering, art and multimedia, etc.).

- Only two participants were active iPhone users

- Four users were familiar with touch based devices.
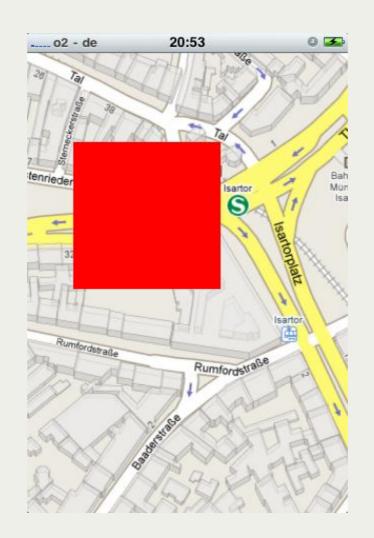
Hypothesis

- "Zones" is the slowest interaction method

- "Pinching" is the most efficient way to zoom compared to others

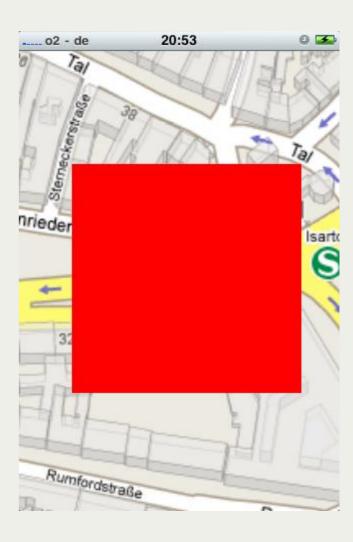- "Rubbing" is the most inefficient way to zoom compared to others

Task

Results

Duration

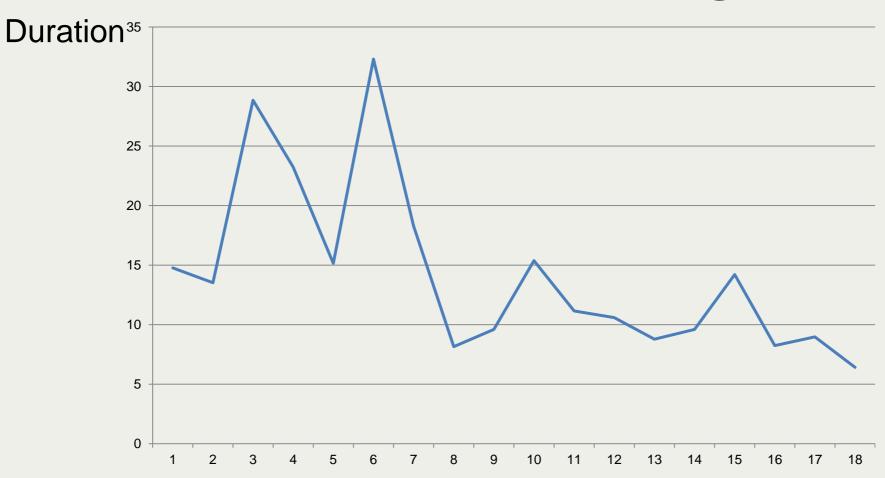

Offset

"Circular" Learning Curve

Results interpretation

- "Rubbing" is the most inefficient way to zoom

- "Tap-Zoom" is the fastest interaction method

- "Circular" has a rapid learning curve

- Unexpectedly "Tap-Zoom" and "Circular" have similar results as "Pinching"
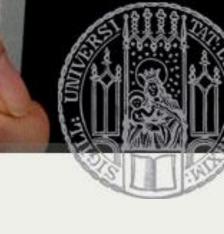
Conclusion

- "Tap-Direction", "Circular" can be used efficiently with one or two hands.

- "Circular" is extremely well suited for zooming with only one touch

Questions?

References

[1] Rubine, D.H. (Dec. 1991). "The Automatic Recognition of Gestures," CMU-CS-91-202, Submitted in Partial Fulfillment of the Requirements of the Degree of Doctor of Philosophy in Computer Science at Carnegie Mellon University P. 18-21

[2] Olwal, A., Feiner, S., and Heyman, S. Rubbing and Tapping for Precise and Rapid Selection on Touch-Screen Displays. Proceedings of CHI 2008 (SIGCHI Conference on Human Factors in Computing Systems), Florence, Italy, April 5-10, 2008, pp. 295-304.