

Towards a Unified Gesture Description Language

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Motivation

gesture-based input can mean many things

touchscreens („multitouch“)
input from multiple users
input with multiple fingers/hands
multiple conventional pointers

tangible interfaces
everyday items
mobile devices
fiducial markers

free-air gestures
assisted (Wiimote)
unassisted (Kinect)

Imagine porting an iPad app to a wall display with Wiimotes...

=> is there a common denominator for these interfaces?



Motivation

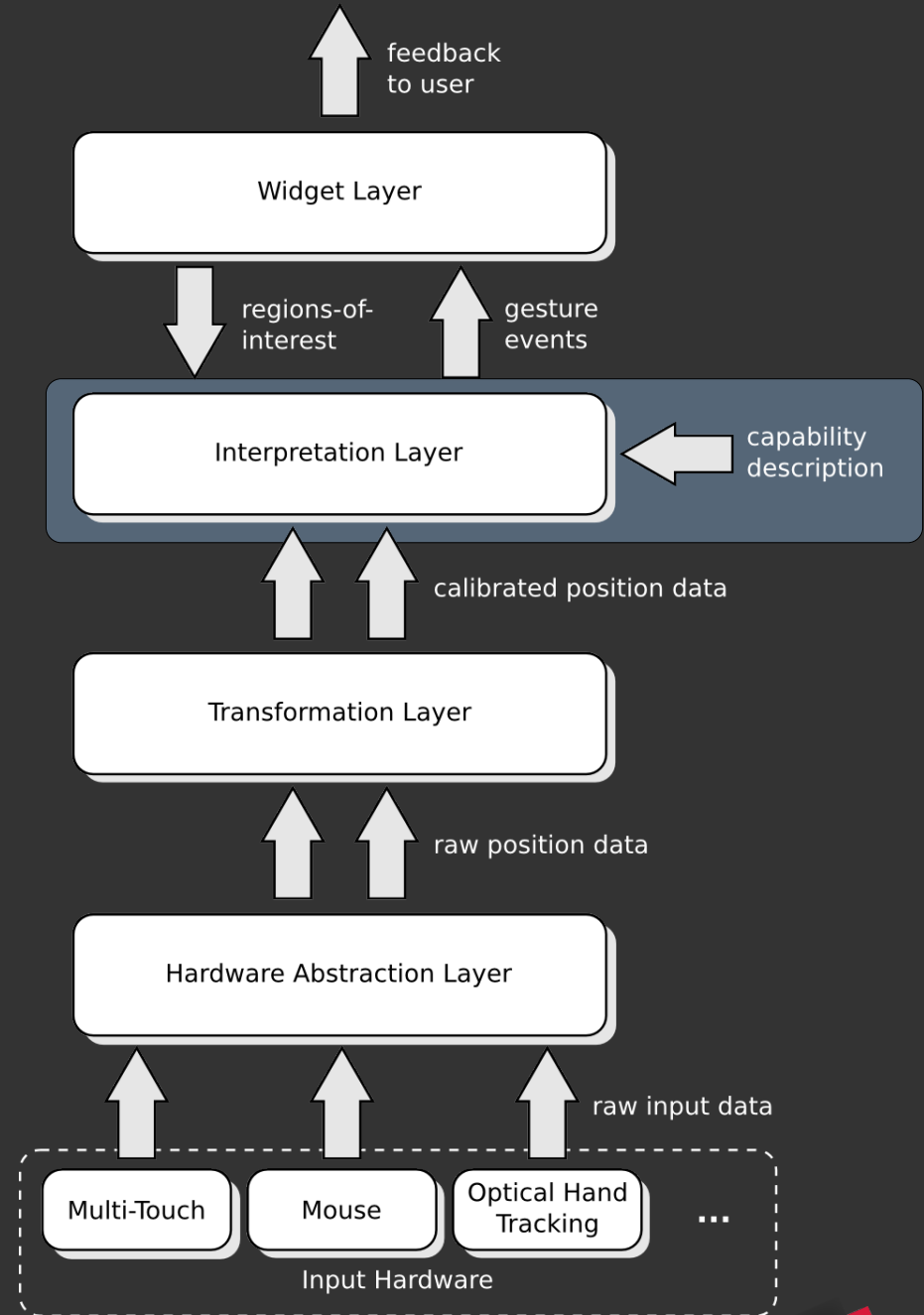
What is a gesture?

common gesture descriptions allow...
user customization
faster development

difficult question: *what is a gesture?*

answer within this context:
*any motion(s) which the user executes
to achieve a certain response*

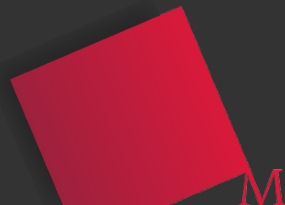
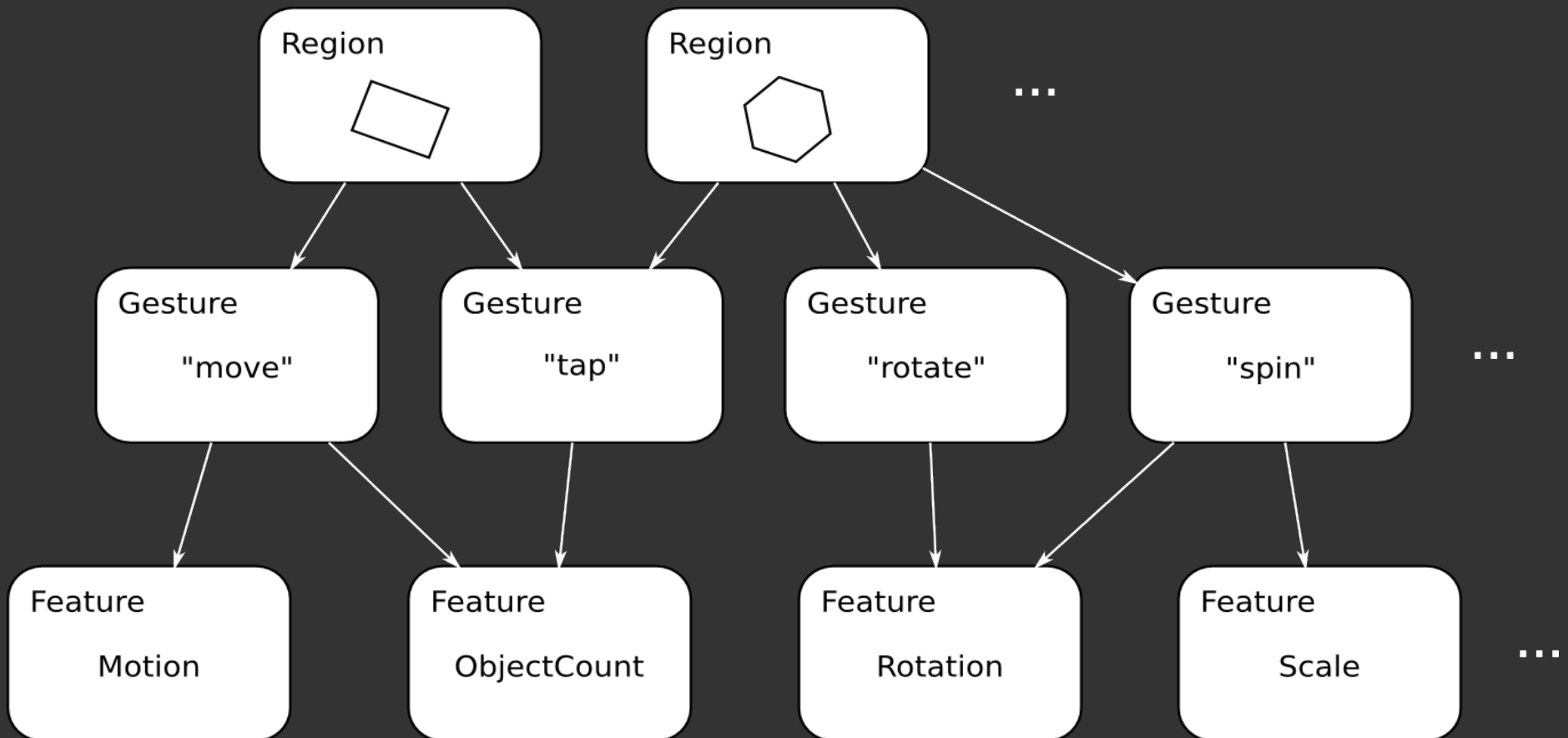
directly leads to the next question:
how can these motions be described?



Concepts

Abstract Description of Gestures

Three core elements: Regions, Gestures, Features



Concepts

Abstract Description of Gestures

Regions:

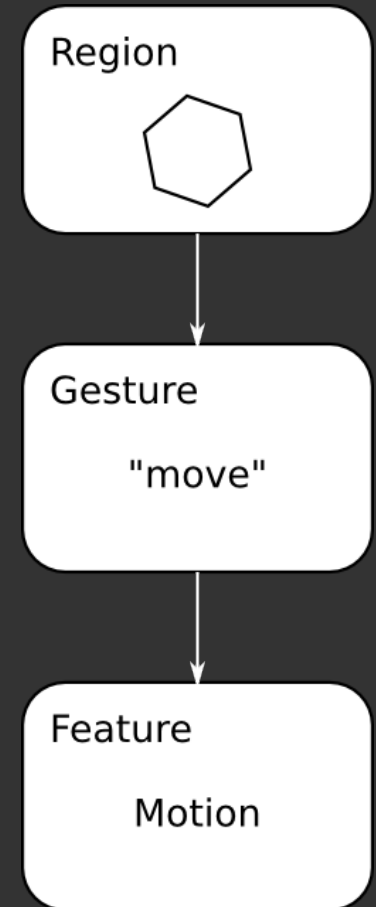
spatial areas defined in reference coordinates
extension of „traditional“ WIMP-UI window objects

Gestures:

sequences of features, either ...
pre-defined by capability description or ...
customized by application

Features:

geometrical/mathematical properties of input data, e.g.:
motion vector
relative rotation
travelled path
further classification through filters and constraint values



Concepts

Examples of Available Features

Motion – average motion vector

Rotation – rotation around center of mass

Scale – scaling w.r.t. center of mass

Path – recognize „shape-based“ gestures

ObjectCount – number of objects inside region

ObjectDimensions – describes shape of object

ObjectOrientation – rotation relative to reference frame

ObjectPosition – absolute position of object

ObjectID – unique ID (e.g., fiducial marker) of an object



Examples

Rotation Gesture

simple example: „*rotate*“ gesture (contains one *Rotation* feature)

rotate	default	RelativeObjectRotation	255	0	6.28	0
Name	Flags	Feature	Mask	Lower..	Upper limit	Result

result value generated through...

multi-finger rotation *or*
object rotation *or*
mouse wheel *or* ...



Examples

Composite Gesture

slightly more complex example: horizontal swipe with two fingers

```
swipe oneshot
```

```
Motion 1 // filters (bitmask, only match fingers)
  100 0 0 // lower limits
  1000 10 10 // upper limits
  0 0 0 // result (empty)
ObjectCount 1 2 2 0
```

Result (only when constraints match): (3-vector, integer) = motion vector + object count

mapping is dependent on...

- hardware capabilities

- user preferences

=> *application doesn't have to care*



Thank you for your attention!

Questions & comments?

