Gesture Recognizers

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Controller Interfaces

- Allow humans to issue commands to computer
  - Mouse
  - Keyboard
  - Microphone
  - Tablet
Touch-based Interfaces

- User interacts with screen using touch
- Touch has position and direction
- Pattern of touch recognized by hardware and OS
- App provides context to patterns to create use-cases
Gestures

- Touch patterns based on iOS Human Interface Guidelines
- Gestures have expected responses that apps should try to conform to
**Tap**

Briefly touch surface with fingertip

**Double tap**

Rapidly touch surface twice with fingertip

**Drag**

Move fingertip over surface without losing contact

**Flick**

Quickly brush surface with fingertip

**Pinch**

Touch surface with two fingers and bring them closer together

**Spread**

Touch surface with two fingers and move them apart

**Press**

Touch surface for extended period of time

**Press and tap**

Press surface with one finger and briefly touch second surface with second finger

Receiving Gestures as Events

1. Hardware notifies operating system about user action
2. OS builds `UITouch` object from touch information
3. `UITouch` object placed inside `UIEvent` object
4. `UIEvent` sent to application
5. `UIResponder` handles event
iOS Events

- Touch events contain one or more finger gestures on-screen
- Motion events process orientation and accelerometer information
- Remote control events receive commands from device accessories
UIResponder

- UIResponder objects can handle events and recognize touch gestures
- Includes UIApplication, UIView, and UIViewController
Gesture Recognizers

- **UIGestureRecognizer** class associated with a view
- Monitor for predefined gestures made in view
- Perform an action once a valid gesture is detected
1. Add gesture recognizer to view in Storyboard

2. Add event handling to view’s view controller in Xcode Editor
   ✤ @IBAction func respondToGesture (recognizer: [UIGestureRecognizer subclass]) {}

3. Associate gesture recognizer in Storyboard with event handler
   ✤ Control-click Recognizer
   ✤ Select its view controller to choose function
Some Details

- Gesture recognizer associated with a single view
- Notifies callback function if touch matches a gesture on this view
- Multiple gesture recognizers needed for multiple views
- Callback handling can be shared between multiple gesture recognizers
- View must have “User Interaction Enabled” to recognize gestures
- View must have “Multiple Touch” Enabled to handle multitouch gestures
UITapGestureRecognizer

- Discrete touch to screen
- Single or multiple taps
- One or two fingers
- Can set number of fingers and number of taps
- Often used to select an item
UISwipeGestureRecognizer

- Straight movement in one direction (up, down, left, right)
- Direction property indicates type of swipe
  - Right is default
- Each swipe gesture recognizer only recognizes one type of swipe in one direction
- Used to switch between views or rapidly scroll in a given direction
UIPanGestureRecognizer

- Continuous touch across screen
- Drag based on one or more fingers moving in a direction
  - User specified minimum and maximum number of fingers to activate gesture
- Can track translation and velocity of gesture
- Used to move an element on the screen
UIPinchGestureRecognizer

- Continuous touch across screen
- Requires two fingers
- Scale factor based on finger position
- Used to zoom in (pinch apart) or zoom out (pinch together)
UIRotationGestureRecognizer

- Continuous touch across screen
- Requires two fingers
- Rotation (in radians) based on finger position and circular movement relative to each other
- Used to rotate a view around a common center
UILongPressGestureRecognizer

- Continuous touch across screen
- One or more fingers
- Press must be held a minimum amount of time before action triggers
- Fingers may not move beyond a specified distance
- Used to select for editing