MODULE

Multi-Touch & Gestures Detectors

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- Q) When does the multi-touch gesture happen?
- A) It happens when more than one pointer (finger) touches the screen.
- Q) How to keep track of each pointer within a gesture?
- A) You have to use the pointer's index and ID.

Q) What is the pureses flowing internet i Project? Exam Help

A) Each pointer gets a unique ID during the gesture's lifetime and it is used to track the pointers within the gesture. This ID is generated once the pointer touches the screen and joins the gesture.

Now, the MotionEvent object safes by the pointer object safes and uses indices to access the pointers' entries. These entries might shift up (change) if a pointer leaves the screen (the gesture) and this will lead to changes in pointers' indices.

Reference: https://developtrandroid.com/training/gestures/multi-WeChat. CStutorcs

Android system generates touch events every time multiple pointers touches the screen at the same time: (Click HERE for more details)

DESCRIPTION
The first pointer (finger) touches the screen. The motion event object contains the initial st
A non-primary (secondary) pointer leaves the screen
A non-primary (secondary) pointer touches the screen
A motion happened to primary or non-primary pointer
The last pointer leaves the screen

Android system provides several methods (MotionEvent methods) to deal with multi-touch events, such as:

METHOD	DESCRIPTION
getPointerCount()	The current number of pointers (fingers) on the screen

CLASS

METHOD	DESCRIPTION
getPointerId(int pointerIndex)	get the pointer id associated with a particular pointer data index in the current gesture
findPointerIndex(int pointerId)	find the pointer index for the given id
getX(int pointerIndex)	find the x coordinate for the given pointer index
getY(int pointerIndex)	find the y coordinate for the given pointer index

Gesture Detectors

The gesture detector classes are used to detect common gestures through a set of motion events.

There are three steps required for the gesture detector to work:

- 1. Create an instance of Gesture Detector class
- 2. Implements the required methods

INTERFACE

3. Intercept the touch events and pass them to the gesture detector

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• Notified of a fling event when it occurs with • e1 is the first event (touch down) echat: cstutorcs e2 is the motion event that triggered the cur • velocityX: The velocity of this event (fling ev float velocityX, float velocityY) • velocityY: The velocity of this event (fling ev onLongPress(MotionEvent e) Notified when a long press occurs with the initial on dowr GestureDetector OnGestureListener • Notified when a scroll occurs with the initial • e1 is the first event (touch down) • e2 is the current event onScroll(MotionEvent e1, MotionEvent e2, distanceX: the distance between e2 and the float distanceX, float distanceY) distanceX: the distance between e2 and the onShowPress(MotionEvent e) The user has performed a down MotionEvent and not perf onSingleTapUp(MotionEvent e) Notified when a tap occurs with the up MotionEvent that **CLASS INTERFACE METHODS DESCRIPTION** Notified when a double-tap occurs. onDoubleTap(MotionEvent e) GestureDetector OnDoubleTapListener onDoubleTapEvent(MotionEvent e) Notified when an event within a double-tap gesture occuronSingleTapConfirmed(MotionEvent e) Notified when a single-tap occurs.

https://tutorcs.com/diffied when a tap occurs with the down MotionEvent th

CLASS	INTERFACE	METHOD
ScaleGestureDetector OnScaleGestureListener		onScale(ScaleGestureDetector detector)
	or OnScaleGestureListener	onScaleBegin(ScaleGestureDetector detector)
		onScaleEnd(ScaleGestureDetector detector)

- Q) Some methods return boolean values, what does that mean?
- A) If a callback method returns true, it informs the parent that the event has been consumed and ready to accept further events from the current gesture. But, if a callback returns false, it indicates that the event is not consumed and it is not interested in the remainder of the gesture.
- Q) What are the differences between onFling() and onScroll() callbacks?
- A) 1) OnFling() needs some velocity in the movement (like swipe to unlock the phone). While, onScroll(), is invoked one you love courfinger with country and speed (when you see the day)
- 2) onFlicg() will be called only once at the end of the gesture, while onScroll() will be called multiple times as you move your finger on the screen.

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Instantiate a Gesture Detection at: CStutorcs

```
1. private GestureDetectorCompat mDetector;
2. private ScaleGestureDetector mScaleDetector;
3.
4. ...
5. ...
6. mDetector = new GestureDetectorCompat(this, this);
7. mScaleDetector = new ScaleGestureDetector(this, this);
```

Where the first parameter is the context and the second one is a reference to the callbacks object.

Implements the required methods

It is possible to create a separate class to handle the implementation of all the callbacks or simply add them to the activity as shown below:

```
    public class MainActivity extends AppCompatActivity implements GestureDetector.OnGestureListener,
GestureDetector.OnDoubleTapListener {
    3. }
```

```
1.
 2.
        public boolean onDown (MotionEvent e) {
 3.
            return false;
 4.
 5.
 6.
        @Override
 7.
        public void onShowPress(MotionEvent e) {
 8.
 9.
10.
11.
12.
        public boolean onSingleTapUp(MotionEvent e) {
13.
          return false;
14.
15.
16.
        @Override
17.
        public boolean onScroll(MotionEvent e1, MotionEvent e2, float distanceX, float distanceY) {
18.
          return false;
19.
20.
21.
        Public voi Assignment Project Exam Help
22.
23.
           return false;
24.
                             https://tutorcs.com
25.
26.
27.
        @Override
28.
        public boolean onFling WeilnEvent en MotionEvent e24 float velocityX, float velocityY) {
    return false:
29.
           return false;
30.
31.
32.
        @Override
33.
        public boolean onSingleTapConfirmed(MotionEvent e) {
34.
           return false;
35.
36.
37.
        @Override
38.
        public boolean onDoubleTap (MotionEvent e) {
39.
          return false;
40.
41.
42.
        @Override
43.
        public boolean onDoubleTapEvent(MotionEvent e) {
44.
           return false;
45.
46.
47.
48.
        @Override
49.
        public boolean onScale(ScaleGestureDetector detector) {
50.
            return false;
```

```
51. }
52.
53. @Override
54. public boolean onScaleBegin(ScaleGestureDetector detector) {
55. return true;
56. }
57. @Override
58. public void onScaleEnd(ScaleGestureDetector detector) {
59.
60. }
```

Intercept the touch events and pass them to the gesture detector

For the gesture detectors to work, you must override the onTouch callback method and forward the MotionEvent object to the detectors.

Q) What will happen if your onTouch() callback returns false instead of true? Change it and observe the results.

```
1. @Override Assignment Project Exam Help
2. public boolean onTouch(View v, MotionEvent event) {
3. mDetector.onTouchEvent (event));
4. mScaleDetector.onTouchEvent/;/tutorcs.com
5. 6. return true;
7. }

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```

Now, the activity in one piece:

```
1.
     package com.fit2081.week11gesturesdetectors;
 2.
 3.
     import androidx.appcompat.app.AppCompatActivity;
     import androidx.core.view.GestureDetectorCompat;
 4.
 5.
 6.
     import android.os.Bundle;
 7.
     import android.view.GestureDetector;
 8.
     import android.view.MotionEvent;
 9.
     import android.view.ScaleGestureDetector;
10.
     import android.view.View;
11.
     import android.widget.TextView;
12.
13.
     public class MainActivity extends AppCompatActivity implements View.OnTouchListener,
     GestureDetector.OnGestureListener, GestureDetector.OnDoubleTapListener, ScaleGestureDetector.OnScaleGestureListener {
14.
15.
         TextView tV;
16.
         private GestureDetectorCompat mDetector;
17.
         private ScaleGestureDetector mScaleDetector;
18.
```

```
19.
        @Override
20.
        protected void onCreate(Bundle savedInstanceState) {
21.
            super.onCreate(savedInstanceState);
22.
            setContentView(R.layout.activity_main);
23.
24.
            tV = findViewById(R.id.textview_id);
25.
            mScaleDetector = new ScaleGestureDetector(this, this);
26.
27.
            mDetector = new GestureDetectorCompat(this, this);
28.
            mDetector.setOnDoubleTapListener(this);
29.
30.
            View myLayout = findViewById(R.id.myLayout);
31.
            myLayout.setOnTouchListener(this);
32.
33.
34.
35.
36.
        @Override
37.
        public boolean onTouch(View v, MotionEvent event) {
38.
            mDetector.onTouchEvent(event);
            Assignment Project Exam Help
39.
40.
41.
42.
                            https://tutorcs.com
43.
44.
        @Override
45.
        public boolean onSingleTapConfirmed(MotionEvent e)
            tv.setText("onSin Wechat: cstutorcs
46.
48.
49.
50.
        @Override
51.
        public boolean onDoubleTap(MotionEvent e) {
52.
            tV.setText("onDoubleTap");
53.
            return true;
54.
        }
55.
56.
        @Override
57.
        public boolean onDoubleTapEvent(MotionEvent e) {
58.
            tV.setText("onDoubleTapEvent");
59.
60.
            return true:
61.
62.
63.
        @Override
64.
        public boolean onDown(MotionEvent e) {
65.
            tV.setText("onDown");
66.
67.
            return true;
68.
```

```
69.
 70.
          @Override
 71.
          public void onShowPress(MotionEvent e) {
 72.
             tV.setText("onShowPress");
 73.
 74.
 75.
 76.
          @Override
 77.
          public boolean onSingleTapUp (MotionEvent e) {
 78.
             tV.setText("onSingleTapUp");
 79.
 80.
             return true;
 81.
 82.
 83.
          @Override
 84.
          public boolean onScroll(MotionEvent e1, MotionEvent e2, float distanceX, float distanceY) {
 85.
              tV.setText("onScroll");
 86.
 87.
              return true;
 88.
 89.
                       ssignment Project Exam Help
 90.
 91.
          public void onLongPress(MotionEvent e) {
 92.
              tV.setText("onLongPress");
                             https://tutorcs.com
 93.
 94.
 95.
 96.
          @Override
          @Override
public boolean onFling MoticeChatienECtStUtOaccs, float velocityY) {
 97.
 98.
             tV.setText("onFling");
 99.
100.
             return true;
101.
102.
103.
104.
          @Override
105.
          public boolean onScale(ScaleGestureDetector detector) {
106.
             tV.setText("onScale");
107.
108.
             return true:
109.
110.
111.
          @Override
112.
          public boolean onScaleBegin(ScaleGestureDetector detector) {
113.
             tV.setText("onScaleBegin");
114.
115.
              return true;
116.
117.
118.
          @Override
```

- Q) What will happen if on Scale Begin() callback returns false instead of true?
- A) The two methods onScale() and onScaleEnd() will not be invoked.
- Q) Why?
- A) if the callback on Scale Begin() returns false, this means it is not interested in the current gesture.
- Q) How can I get the pinch (zoom/scale) size at the end of the scale gesture?
- A) you can return the event span using **detector.getCurrentSpan()** where detector is the input parameter to onScaleEnd() callback.

Click HERE for more information about the ScaleGestureDetector.

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Q) What if want to implement only a subset of the callback? in other words, my app requires one or two callbacks only. $\frac{\text{Note of the callbacks}}{\text{Note of the callbacks}}$

A) You need to implement a class that extends the convenience classes SimpleOnGestureListener or SimpleOnScaleGestureListener.

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Build a class the extends SimpleOnGestureListener

```
1.
     private class MyGestureListener extends GestureDetector.SimpleOnGestureListener {
 2.
 3.
            @Override
 4.
            public boolean onSingleTapConfirmed(MotionEvent e) {
 5.
                 tV.setText("onSingleTapConfirmed");
6.
                 return true;
 7.
 8.
9.
            @Override
10.
            public boolean onDoubleTap(MotionEvent e) {
11.
                tV.setText("onDoubleTap");
12.
                 return true;
13.
14.
15.
            @Override
16.
            public boolean onDown(MotionEvent e) {
17.
                 tV.setText("onDown");
18.
```

```
19.
                 return true;
20.
21.
22.
             @Override
23.
             public boolean onScrol1(MotionEvent e1, MotionEvent e2, float distanceX, float distanceY) {
24.
                 tV.setText("onScroll");
25.
26.
                 return true;
27.
             }
28.
29.
             @Override
30.
             public void onLongPress(MotionEvent e) {
31.
                 tV.setText("onLongPress");
32.
33.
34.
```

As you can see from the code above, the class MyGestureListener which works as a listener implements a subset of the interface OnGestureListener callbacks.

Build a class the extends SimpleOnScaleGestureListener

```
ssignment Project Exam Help
1.
2.
       @Override
3.
       public boolean onScale(ScaleGestureDetector detector) {
          tv.setText("onSca https://tutorcs.com
4.
5.
6.
          return true;
                        WeChat: cstutorcs
7.
8.
9.
       @Override
10.
       public boolean onScaleBegin (ScaleGestureDetector detector) {
11.
          tV.setText("onScaleBegin");
12.
13.
          return true;
14.
15.
16.
```

Again, extending the convenience class SimpleOnScaleGestureListener allows you to implement only the callbacks which your application needs.

Now, let's provide them to the detectors:

```
    MyScaleListener MyScaleListener=new MyScaleListener();
    mScaleDetector = new ScaleGestureDetector(this, MyScaleListener);
    MyGestureListener myGestureListener = new MyGestureListener();
    mDetector = new GestureDetectorCompat(this, myGestureListener);
    mDetector.setOnDoubleTapListener(myGestureListener);
```

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