Mobile Interaction

Auditorium Exercise 5

Human-Computer Interaction Group

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INTERACTIVE SESSION

Gestures enaled devices in our daily life?

Gestures of in our daily life?

- Laptop mouse pab

- Mouse

- Smart glasses

- Tangible phones

- Smart watches

- Fridge

- Headphones

- Car

Gestures of in our daily life?

- Pinch and zoom
- Scroll (one and two finger)
- Swipe
- Double tap (one and two finger)
- Tap on back of phone (screen shot, selfie)
- Hold (to stop voice over)

Purpose of the gestures

Purpose of the gestures

- Make navigation smoother and faster

- Easy to remember

- Less error and speed

- Effortless

- Less buttons

Advatages of gestures

Advatages of gestures

- Can be performed any where on the screen

- Faster because of mental mapping.

- Easy to remember.

Which is the intended key?: qu oder qi?

- A: qu

- B: qi

Goodman, Venolia, Steury, Parker. Language modeling for soft keyboards. IUI 2002.

Frequency Distribution of Bigrams in English

P("Q")
=17/5000
=3.4×10^{-3}

P("U"|"Q")
=15/17
=0.882

P("Q", "U")
= P("Q") x P("U" | "Q")
= 17/5000 * 15/17
= 15/5000

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	TOTAL
A	3	6	14	27	1	4	6	2	17	1	2	32	14	64	2	12		44	41	47	13	7	3		12		374
B	4			18					2	1		6	1		4			2	1	1	2				7		49
C	20		3	1	32	1		14	7		4	5	1	1	41			4	1	14	4		1		1		155
D	32	4	4	8	33	8	2	2	27	1		3	5	4	16	5	2	12	13	15	5	3	4		1		209
E	35	4	32	60	42	18	4	7	27	1		29	14	111	12	20	12	87	54	37	3	20	7	7	4	1	648
F	5		2	1	10	11	1		39			2	1		40	1		9	3	11	3		1		1		141
G	7		2	1	14	2	1	20	5	1		2	1	3	6	2		5	3	4	2		1				82
H	20	1	3	2	20	5			33			1	2	3	20	1	1	17	4	28	8		1		1		171
I	8	2	22	6	13	10	19			2		23	9	75	41	7		27	35	27		25		15		2	368
J	1			2									2						2								7
K	1		1		6				2			1		1				1									13
L	8	3	3	9	37	3	1	1	20			27		1	13	3		2	6	8	2	2	2		10		183
M	36	6	3	1	26	1		1	9				13		10	8		2	4	2	2				2		126
N	26	3	19	52	57	9	27	4	30	1	2	5	5	8	18	3	1	4	24	82	7	3	3		5		397
O	7	4	8	12	3	25	2	3	5	1	2	19	25	77	6	25		64	14	19	37	7	8	1	2		376
P	14	1	1	1	23	2		3	6			13	4	1	17	11		18	6	8	3	1	1		1		135
Q												1			1			1			15					17	17
R	39	2	9	17	98	6	7	3	30	1	1	5	9	7	28	13		11	31	42	5	5	4		9		382
S	24	3	13	5	49	12	2	26	34		1	2	3	4	15	10		5	19	63	11	1	4		1		307
T	28	3	6	6	71	7	1	78	45			5	6	7	50	2	1	17	19	19	5		36		41	1	454
U	5	3	3	3	11	1	8		5			6	5	21	1			31	12	12		1					130
V	6				57				12					1						1							77
W	12				22			4	13			1		2	19			1	1						1		76
X	2		2	1	1	1		1	2					1	1	2		1	1	7							23
Y	6	2	4	4	9	11	1	1	3			2	2	6	10	3		4	11	15	1		1				96
Z	1				2				1																		4
	370	46	154	217	657	137	82	170	374	8	14	189	123	397	373	130	17	368	304	462	130	75	77	23	99	4	5000

P("Q", "I")
= P("Q") x P("I" | "Q")
= 17/5000 * 0/17
= 0

http://www.umich.edu/~umich/fm-34-40-2/appa.ps

Touch Point Distribution for a Key/Letter

- Empirically determine the distribution
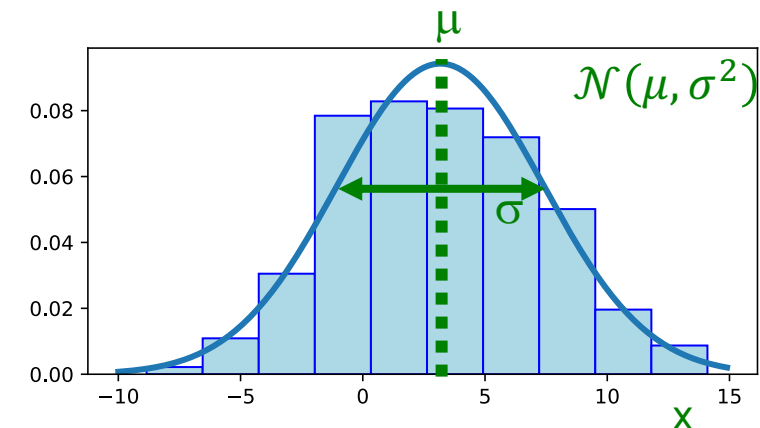 of the touch points for a given key:

$$P\big(touch = (x,y)\big|letter = l_i\big)$$

- Estimation

  - For each letter collect training data of touch points

  - Distribution of touch points is basis of empirical probability distribution function
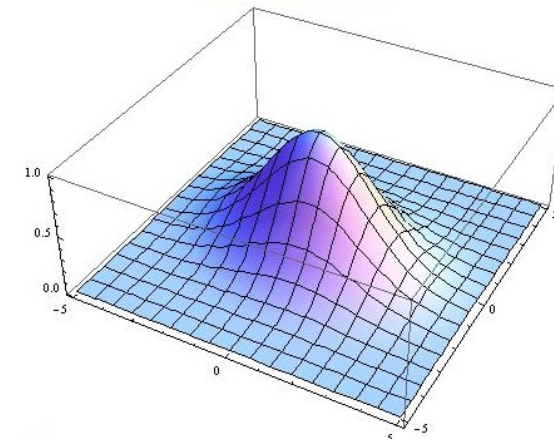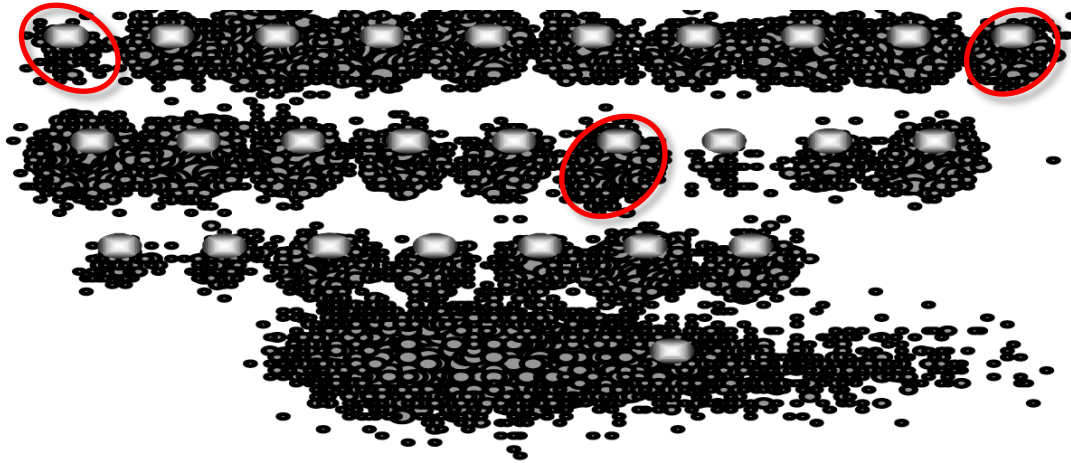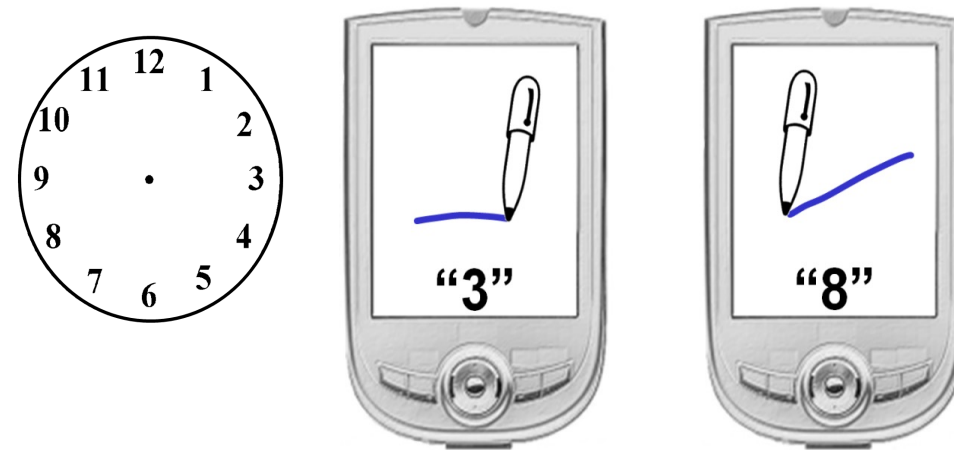

Simplified to 1D:
$$P\big(touch = x\big|letter = l_i\big)$$

What is P(touch | letter)?

Goodman, Venolia, Steury, Parker. Language modeling for soft keyboards. IUI 2002.

Clock Metaphor

- Numeric entry on PDA ("PiePad")

- Which is faster?
- A: Handwriting
- B: PiePad

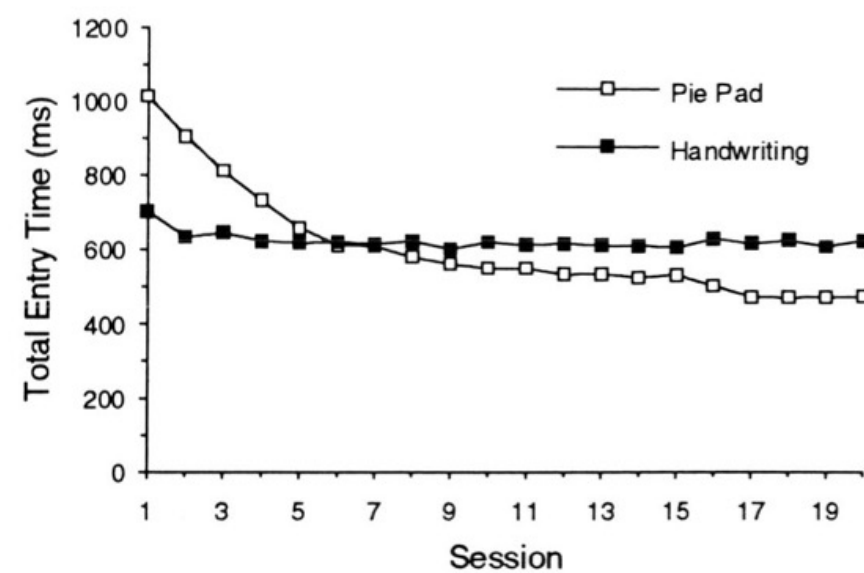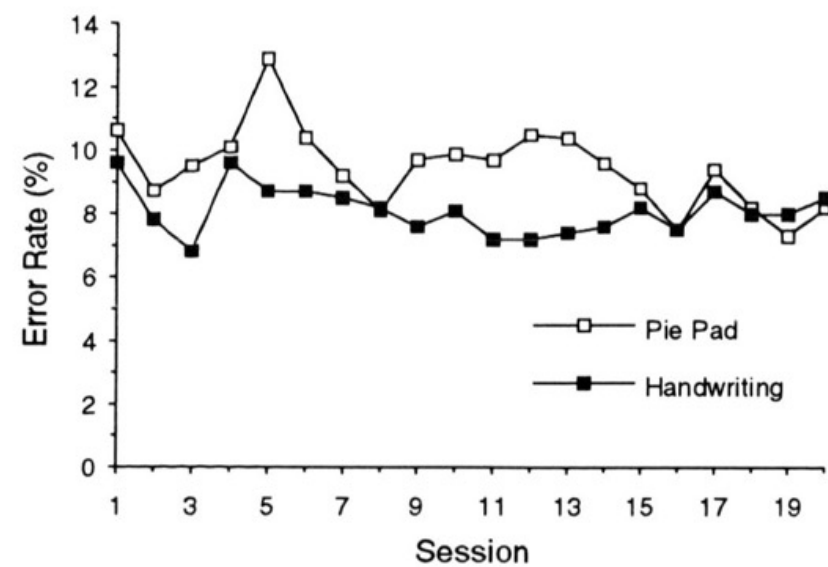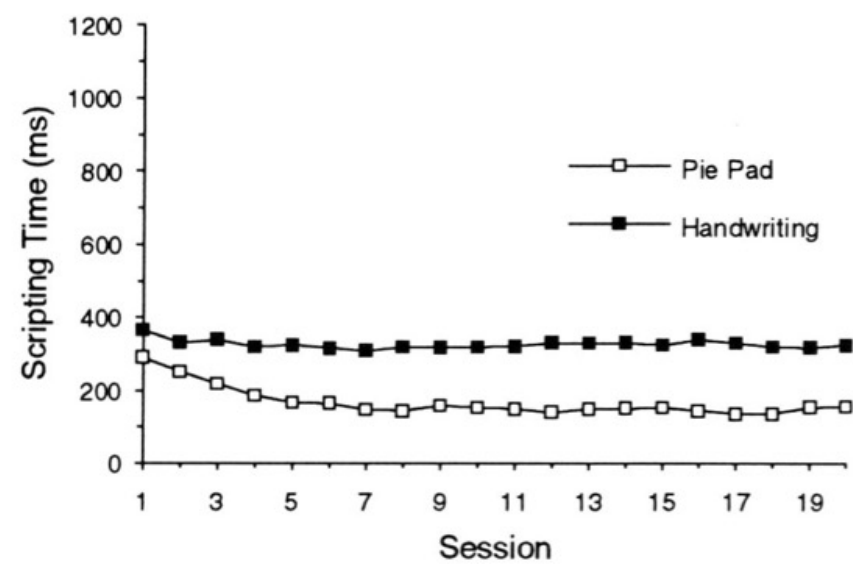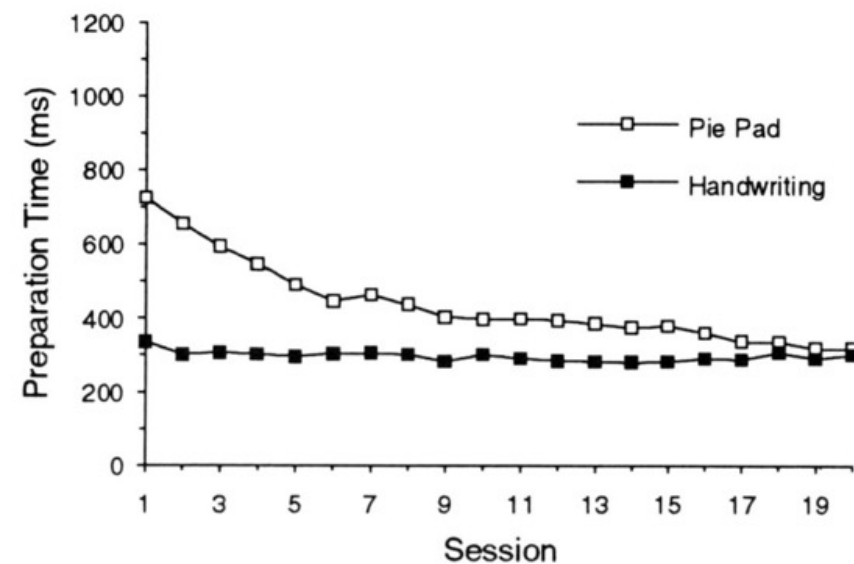McQueen, MacKenzie, Zhang. An extended study of numeric entry on pen-based computers. Proc. of Graphics Interface '95.

Clock Metaphor

- Numeric entry on PDA ("PiePad")

- Which is faster?
- A: Handwriting
- B: PiePad (After 2h Training)
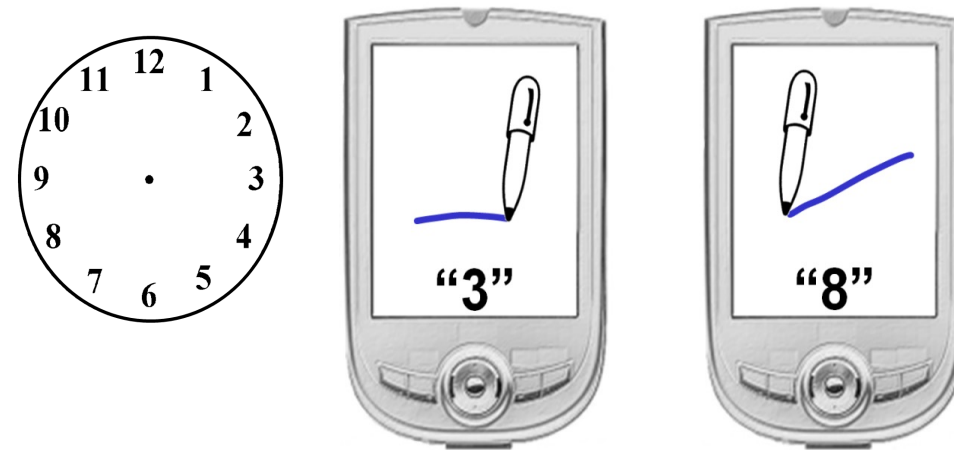
McQueen, MacKenzie, Zhang. An extended study of numeric entry on pen-based computers. Proc. of Graphics Interface '95.

Clock Metaphor

- Numeric entry on PDA ("PiePad")

- Which is faster?
- A: PiePad
- B: Softkeyboard
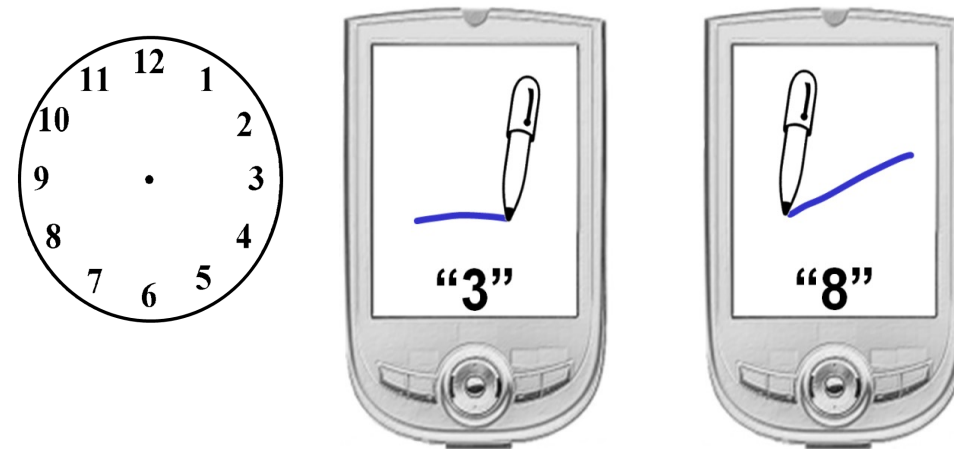
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Clock Metaphor

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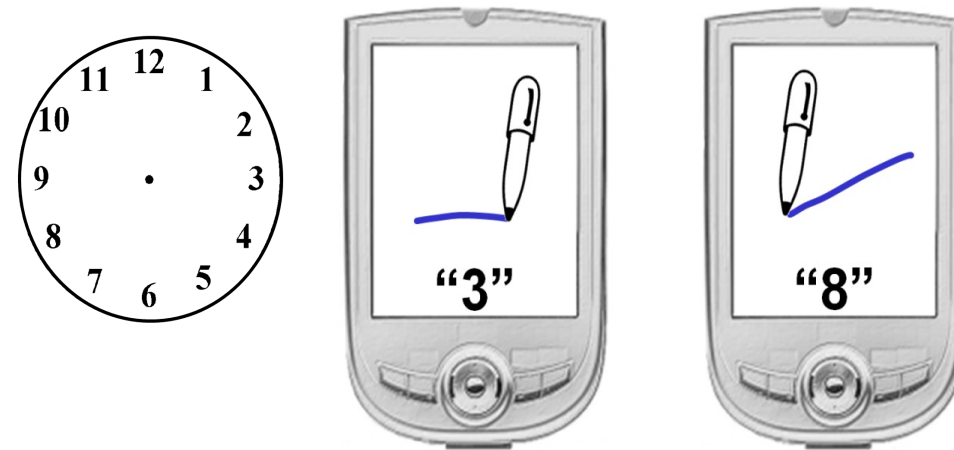
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Clock Metaphor

| Condition	Error Rate (%)	Entry Time (ms)	Speed (wpm)
Pie Pad	8.2	473	25.4
Handwriting	7.9	619	19.4
Soft Numeric Keyboard	1.2	395	30.4

McQueen, MacKenzie, Zhang. An extended study of numeric entry on pen-based computers. Proc. of Graphics Interface '95.

Which touchscreen gesture is this?
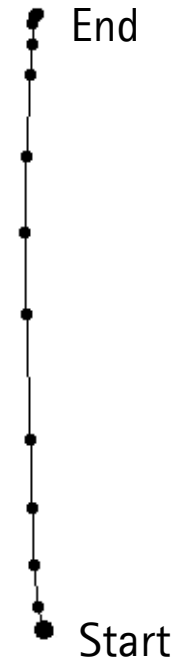
- A: Flick
- B: Drag
- C: Pinch-to-zoom-in
- D: Pinch-to-zoom-out

End

Start

Which touchscreen gesture is this?

- A: Flick
- B: Drag
- C: Pinch-to-zoom-in
- D: Pinch-to-zoom-out

End
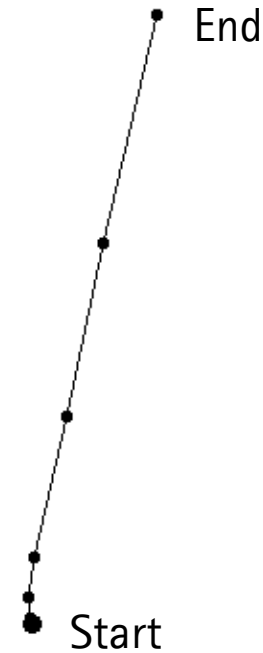
Start

Which touchscreen gesture is this?

- A: Flick
- B: Drag
- C: Pinch-to-zoom-in
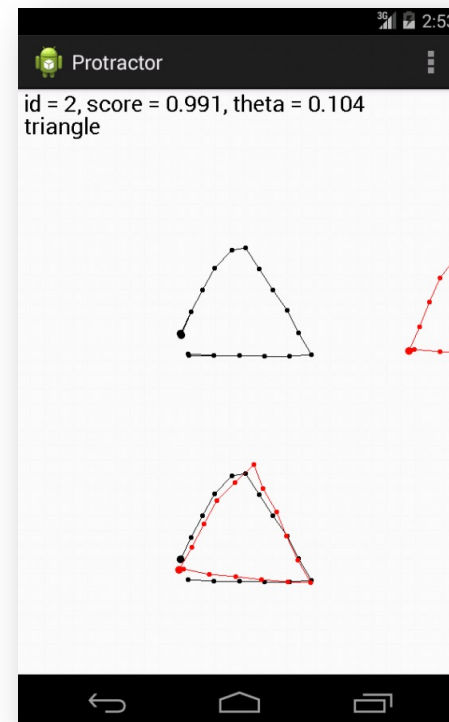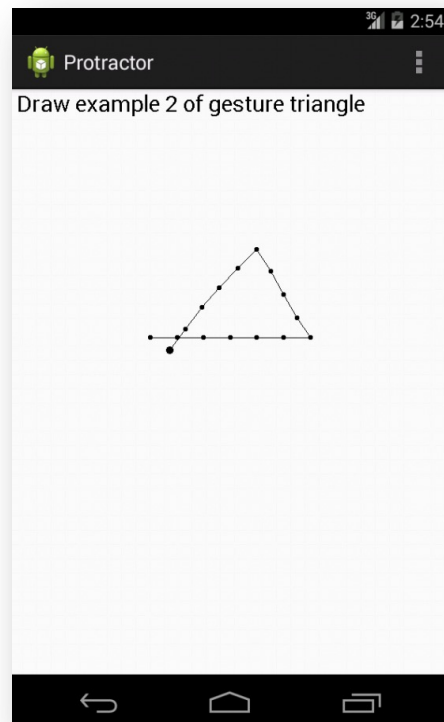- D: Pinch-to-zoom-out

Start

End

End

Start

ASSIGNMENT 05 PREVIEW

Exercise 1 – Gestures

- Aspects of gestures

a)   Advantages and disadvantages compared to GUI

b)   Do you use gestures? Why?

Exercise 2 – Protractor

- Protractor-Algorithm – implementation and evaluation

Exercise 2 – Protractor

a) Implement methods within the given template `pathLength()`, `centroid()`, `translate()` `rotate()`

b) Create your own gesture set

c) Test the recognition rate of your gesture set

d) Evaluate the confusion matrix

Exercise 3 – Composables with State

a) Explain text = stringResource(R.string.calculate_tip)

b) In split view, what happens to the preview when a spacer height to 0.dp?

c) Add the EditNumberField composable, Why is val amountInput = "0" not useful

d) What is an "initial composition" and what is a "recomposition"

e) How does the system track which state has changed? How to create mutable observable state?

f) Explain the problem with the mutable Observable value.

g) How the Kotlin property delegation works and how it is used here

Exercise 3 – Composables with State

h) What type of keyboard is appropriate for the app.

i) Briefly explain the term "state hoisting".

j) Why are the parameters value and onValueChanged both necessary for EditNumberField.

QUESTIONS?