Gesture Recognizer

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Developer contact: raphaelmarquesapps@gmail.com

Release Notes

Version 2.1

- New “Use Lines Order” option in gesture asset to make the order of lines matter to the recognition
- New “Use Lines Directions” option in gesture asset to make the direction of the lines matter to the recognition
- New “Reverse Direction” button in gesture asset to reverse the direction of a line
- New (“-“ and “+”) buttons in gesture to change the order of a line
- Documentation of the GesturePattern asset

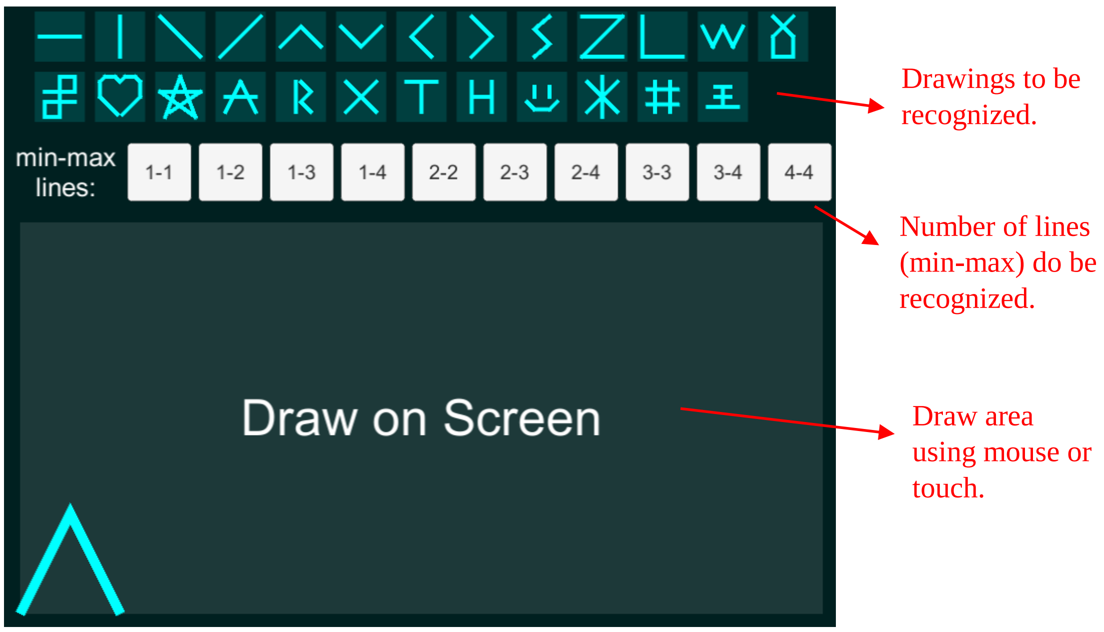
Version 2.0

- Multi Stroke (a gesture made of many lines)
- All scripts inside ***GestureRecognizer*** namespace
- New easier editor do create gestures
- Button do convert old gesture asset to the new one
- Draw area can be placed anywhere on screen

Example Scene

See example scene at ***GestureRecognizer/Example*** folder.

Execute the example scene and draw on bottom area using mouse or touch. The example is set to recognize symbols made of 1 to 4 lines. You can change this configuration clicking on each button. When a symbol is recognized, it blinks and its id shows at the screen.

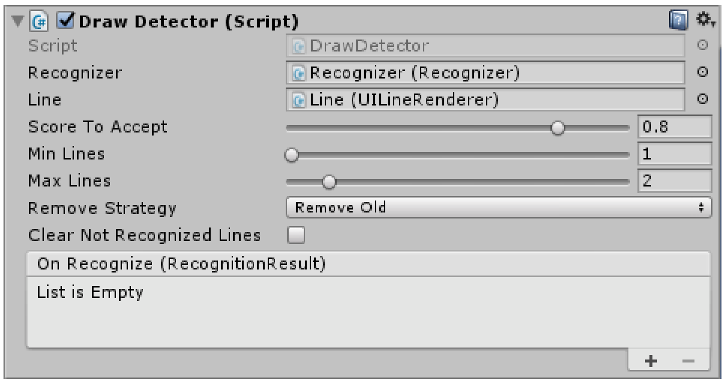

min-max lines:
1-1
1-2
1-3
1-4
2-2
2-3
2-4
3-3
3-4
4-4
Draw on Screen
Drawings to be recognized.
Number of lines (min-max) do be recognized.
Draw area using mouse or touch.

The scene is made of those objects and components:

- Object ***"Recognizer"*** with ***Recognizer*** component, filled with ***GesturePattern*** assets you can recognize.
- Objects "***Canvas/Reference/Image*/Line"*** with ***GesturePatternDraw*** component, with ***Pattern*** attribute set to draw the ***GesturePattern*** asset on canvas.
- Objects "***Canvas/Buttons/Button*"*** are buttons with ***OnClick*** event set to change ***MinLines*** and ***MaxLines*** attributes of ***DrawDetector***.
- Object ***"Canvas/DrawArea"*** with ***DrawDetector*** component to handle user drawing on screen, and ***ExampleGestureHandler*** component, to show how to handle the recognition result.

The DrawDetector component

This component is responsible for capture user drawing (by mouse or touch), store and show what user drew, and recognize it when user stop drawing using the Recognizer component.



Draw Detector (Script)

Script	DrawDetector
Recognizer	Recognizer (Recognizer)
Line	Line (UILineRenderer)
Score To Accept	0.8
Min Lines	1
Max Lines	2
Remove Strategy	Remove Old
Clear Not Recognized Lines	☐

On Recognize (RecognitionResult)

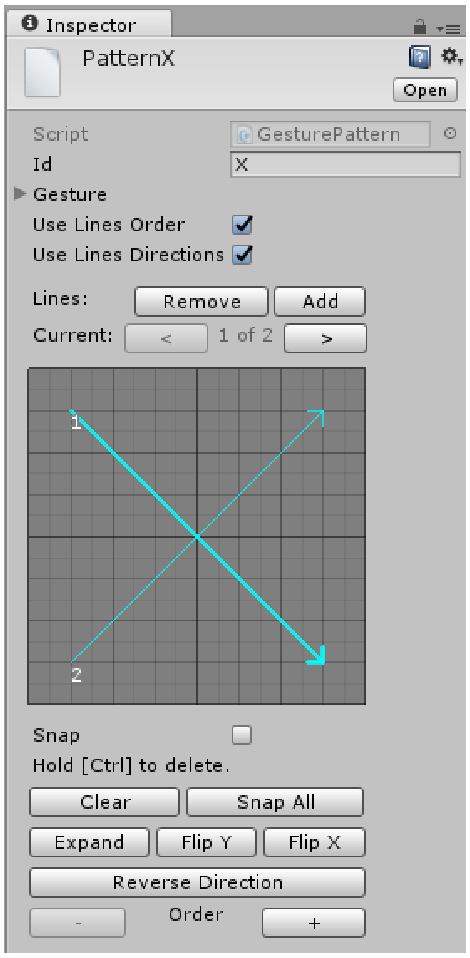
List is Empty

Its attributes are:

- Recognizer: the object with Recognizer component attached.
- Line: object inside DrawDetector hierarchy with a UILinerenderer.
- Score To Accept: score (0.0 to 1.0) to accept some drawing.
- Min Lines: minimum number of lines of a gesture.
- Max Lines: maximum number of lines of a gesture.
- Remove Strategy: what to do when the user stop drawing and the number of lines reach the maximum value.
- Clear Not recognized Lines: if will remove lines that aren't part of the recognized gesture.
- OnRecognize: event you can a method to handle the recognition result

The GesturePattern asset

This asset is responsible create and store gestures to be recognized:



Script: GesturePattern
Id: X
Use Lines Order: ✓
Use Lines Directions: ✓
Current: 1 of 2
Snap: ☐

- **"Id"**: The gesture identifier. You can use this Id to know each gesture was recognized. Many gestures can have the same Id.
- **"Use Lines Order"**: Check this option if the order of the lines matters for recognize this gesture.
- **"Use Lines Directions"**: Check this option if the direction of each line matters for recognize this gesture.
- **"Remove" button**: Click to remove the current line
- **"Add" button**: Click to add a new line to the gesture
- **Current buttons**: Click on the "<" and ">" buttons to navigate through the lines of the gesture. The selected gesture will be draw with a thicker line.
- **Draw area:** Use to draw each line of the gesture. Click to add new points to a line, or drag some point do change it. Click on a point holding the Ctrl key to delete a point. If the "Use Lines Order" is checked, the order number of each line will be shown. If the "Use Lines Directions" is checked, an arrow will be shown to indicate line direction.
- **Snap**: Check this option to draw following the grid.
- **"Clear" button**: Click to clear all the gesture asset data.
- **"Snap All" button**: Click to snap all points of all lines to the grid.
- **"Expand" button**: Click to expand the current line to occupy all the draw area.
- **"Flip Y" button**: Click to mirror the current line vertically.
- **"Flip X" button**: Click to mirror the current line horizontally.
- **"Reverse Direction" button**: Click to change de direction of the current line.
- **Order buttons**: Click on the "-" and "+" buttons to change the order of the current line.

Configuration from scratch

To create your own scene you must follow those steps:

1. Create gesture files using the menu ***"Assets/Create/GestureRecognizer/GesturePattern"***
   - 1.1. Select the created asset and look to the ***Inspector***.
   - 1.2. Configure the ***id*** attribute. It will be used to know which gesture was recognized.
   - 1.3. Add and remove lines. You draw each line clicking on the grid.
   - 1.4. Set ***"UseLinesOrder"*** option if the order of each line matters.
   - 1.5. Set ***"UseLinesDirections"*** option if the direction of each line matters.
   - 1.6. Check the ***Snap*** option to draw lines aligned to grid.
   - 1.7. You can create more than one asset with same id. This will give user many ways to draw the same symbol.
2. Create a new object, the ***"Recognizer"***
   - 2.1. Add the ***Recognizer*** component to it.
   - 2.2. Fill the ***Patterns*** array attribute with all ***GesturePattern*** assets you want to recognize.
3. Create a canvas image using the menu ***"GameObject/UI/Image"***, the ***"DrawArea"***
   - 3.1. Add the ***DrawDetector*** component to it.
   - 3.2. Create a new ***"Line"*** object inside ***"DrawArea"*** hierarchy with the ***UILineRenderer*** component.
   - 3.3. Fill the ***Recognizer*** attribute of ***DrawDetector*** with the ***"Recognizer"*** object.
   - 3.4. Fill the ***Line*** attribute of ***DrawDetector*** with the ***"Line"*** object inside it.
   - 3.5. Fill the ***OnRecognize*** event call some method to deal with the recognition result.
     - 3.5.1.The method must be public, void, and have a ***RecognitionResult*** parameter.
     - 3.5.2.See the example script ***ExampleGestureHandler***.
4. Make sure there is an ***EventSystem*** object in your scene. If not, use the menu ***"GameObject/UI/EventSystem"*** to create it.

Script Reference

- Class: `Recognizer : MonoBehaviour`
  - Description: Class to recognize a gesture among many gesture patterns.
  - `public List<GesturePattern> patterns;`
    - List of assets that can be recognized. You can change the list in runtime.
  - `public RecognitionResult Recognize(GestureData data)`
    - Method to find/recognize a gesture (inside data) in the patterns list.

- Class: `GesturePattern : ScriptableObject`
  - Description: Class to store and edit a gesture
  - `public string id;`
    - The identifier of the gesture, use to know each gesture was recognized.
  - `public GestureData gesture;`
    - The gesture made of many lines.
  - `public bool useLinesOrder;`
    - If the order of the lines should be used to recognize the gesture.
  - `public bool useLinesDirections;`
    - If the direction of the lines should be used to recognize the gesture.

- Class: `GestureData`
  - Description: Class to store a gesture.
  - `public List<GestureLine> lines;`
    - List of lines of the gesture.

- Class: `GestureLine`
  - Description: Class to store one line of a gesture.
  - `public List<Vector2> points;`
    - List of points of the gesture line.

- Class: `RecognitionResult`
  - Description: Class to hold the recognition result
  - `public GesturePattern gesture;`
    - The gesture found in the Recognizer array of assets.
  - `public Score score;`
    - The score that holds the similarity between two gestures.

Tips for better recognition results

- Use pretty different gestures.
- Reduce the number of gestures list.
- Test to find the better “Score To Accept” to your gestures.