

# **A Proposal of Application for Learning about Document Structuring and Styling through Pictogram Content Creation**


**September 20, 2024**

**WSSM-2024**

**Yamato Kishita, Mikihiro Ishii, Kazunari Ito  
Aoyama Gakuin University**

# Pictagramming

Application for learning about notation of markup language and style sheet language through pictogram content creation



**PICTAGRAMMING**

```
1 <pa type="a" scale="1" background-color="#ffffff">
2   <hp x="20" y="30" scale="0.6" body="60"
   lua="-120" lla="45" rua="45" rla="90" lul="20"
   lll="-60" rul="45" rll="-60" color="#222325"
   orientation="front"></hp>
3   <line x1="-160" y1="150" x2="80" y2="150"
   width="20" color="#222325"></line>
4   <line x1="80" y1="140" x2="80" y2="210"
   width="20" color="#222325"></line>
5   <line x1="80" y1="200" x2="160" y2="200"
   width="20" color="#222325"></line>
6 </pa>
```

<https://pictogramming.org/apps/pictagramming/>

# Outline

1. Background
2. Previous Research: Pictogramming Series
3. Pictogramming
4. Classroom Practice and Evaluation
5. Summary and Outlook

# Outline

1. Background
2. Previous Research: Pictogramming Series
3. Pictogramming
4. Classroom Practice and Evaluation
5. Summary and Outlook

# Background

Web content creation practice in limited time

- Difficult to understand **HTML** and **CSS**
- Difficult to create **high quality design content**

→ Need for learning environment that users can learn about document structuring and styling efficiently

# Outline

1. Background
2. Previous Research: Pictogramming Series
3. Pictogramming
4. Classroom Practice and Evaluation
5. Summary and Outlook

# Previous Research: Pictogramming Series

## Outline

- Applications for learning programming and information design through pictogram content creation

## Name

- Pictogramming = Pictogram + Programming

## URL

- <https://pictogramming.org/>

## Some versions

- Pseudo-language, Visual programming, Python, JavaScript, Ruby

# Previous Research: Pictogramming Series

## Pictogramming (pseudo-language)

The Pictogramming software interface displays a yellow triangular warning sign with a black silhouette of a person falling over a step. To the right of the sign is a text editor window titled "PICTOGRAMMING" containing the following code:

```
1 A
2 PENW 10
3 L -120 160 60 160
4 L 60 160 60 190
5 L 60 190 160 190
6 M -20 110
7 SC 0.5
8 R BODY 45
9 R BODY 15 0.2
10 R LUA -120 0.2
11 R LLA 45 0.2
12 R RUA 45 0.2
13 R RLA 90 0.2
14 R LUL 20 0.2
15 R LLL -60 0.2
16 R RUL 45 0.2
17 R RLL -60 0.2
```

Below the sign and code is a control panel with various buttons and a text input field. The text input field contains "Watch your step!". The control panel includes buttons for "R LUA 90 1", "RW LUA 90 1", "M 50 100 1", "MW 50 100 1", "SAYW Hello! 1", "W 1", "LUA", "LLA", "RUA", "RLA", "LUL", "LLL", "RUL", "RLL", "BODY", "HEAD", "Scale 0.1", "REPEAT 3 END", "Front", "Side", "Clear", "PEN RELEASE LH", "PEN HOLD LH", "PEN ROUND", "PEN SQUARE", "PEN BUTT", "Stamp", "PENW 10", "L 100 0 200 300", "O 100 0 50 150 0", "CS", "Prohibit", "Attention", "Instruction", "Safety", "Safety Green", "Safety Red", "Reverse", "Skelton", "Normal", "SET valName 0", "IF 0.5 .. END", "DEFINE .. END", "EXECUTE", "EXECUTE WAIT", "DEFINE OBJECT .. END", "MOVE OBJECT", and "MOVE OBJECT WAIT".



# Previous Research: Pictogramming Series

## Pictoach (visual programming language)

The screenshot displays the Pictoach visual programming environment. On the left, a green canvas shows a white pictogram of a person waving their right hand. The person is standing on a white horizontal line representing the ground. A small white circle is visible near the person's feet. Below the canvas, a text input field contains the name "WaveHand".

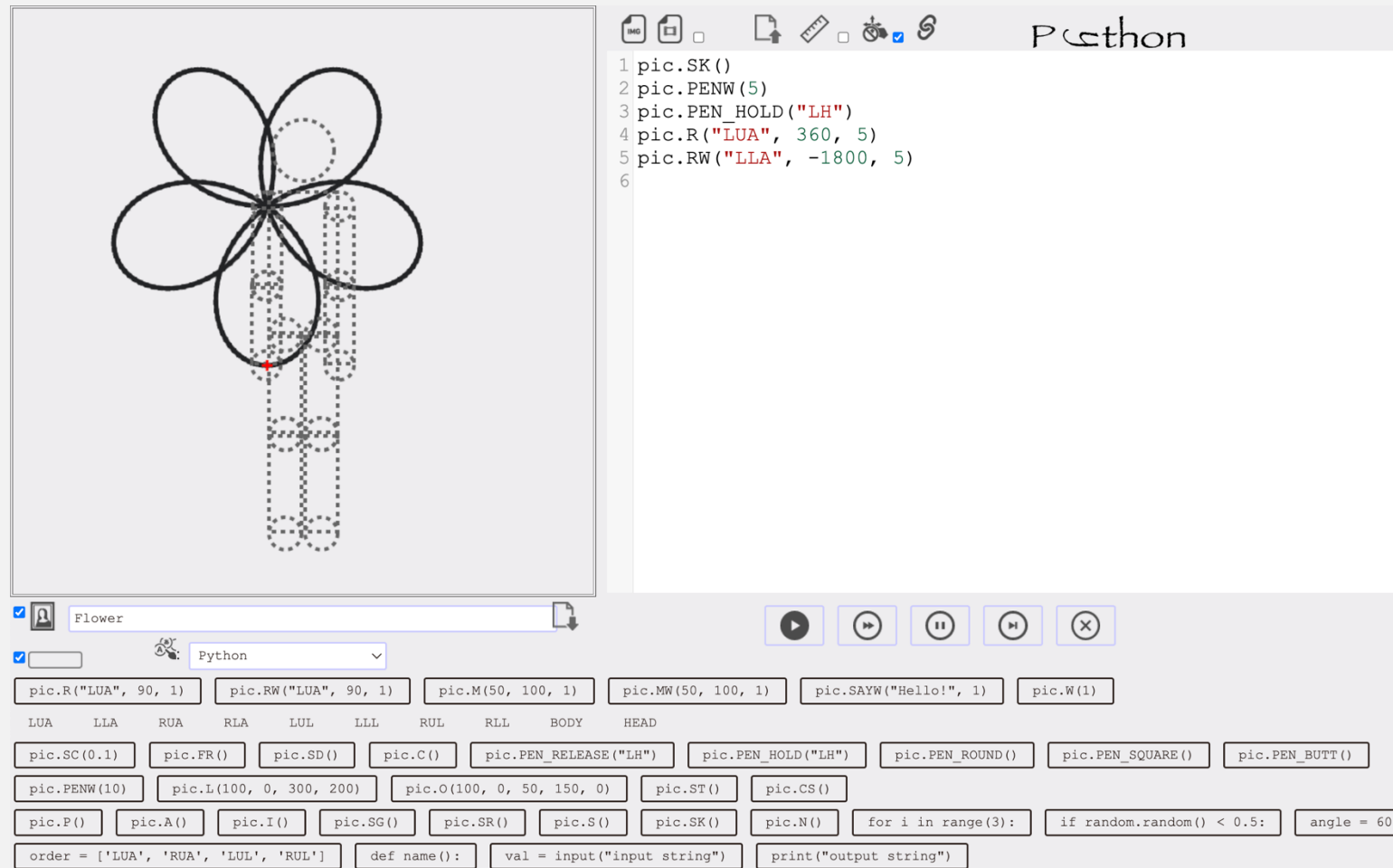
On the right, the "Pictoach" code editor is visible. It features a sidebar with categories: Motion, Drawing, Events, Logic, Loops, Math, Text, Lists, Variables, Functions, Input/Output, Swimming, and Others. The main code area contains the following blocks:

- When run button pressed
- Set safety green mark
- Draw "floor"
- Rotate left shoulder 120 degrees clockwise for 1 seconds
- Rotate right crotch 10 degrees counter-clockwise for 1 seconds and wait
- Move 120 rightward and 40 upward for 1.2 seconds
- Move "floor" 120 rightward and 40 upward for 1.2 seconds
- probability of 0.5
- do repeat 3 times
  - do
    - Rotate left elbow 90 degrees clockwise for 0.3 seconds and wait
    - Rotate left elbow 90 degrees counter-clockwise for 0.3 seconds and wait
- Object "floor"
  - Draw line from ( -150 , 280 ) to ( 150 , 280 )
  - Draw oval with center point ( 130 , 230 ), width 50, height 80, rotate angle 0

At the bottom of the interface, there are control buttons for play, step forward, pause, step back, and close.

# Previous Research: Pictogramming Series

## Picthon (Python)



# Previous Research: Pictogramming Series


If Pictogramming Series has  
**HTML** and **CSS** version,  
we can realize efficient and enjoyable  
web production practice.

# Outline

1. Background
2. Previous Research: Pictogramming Series
3. Pictagramming
4. Classroom Practice and Evaluation
5. Summary and Outlook

# Pictagramming

Application for learning about notation of **markup language** and **style sheet language** through pictogram content creation



Watch your step!

**PICTAGRAMMING**

```
1 <pa type="a" scale="1" background-color="#ffffff">
2   <hp x="20" y="30" scale="0.6" body="60"
   lua="-120" lla="45" rua="45" rla="90" lul="20"
   lll="-60" rul="45" rll="-60" color="#222325"
   orientation="front"></hp>
3   <line x1="-160" y1="150" x2="80" y2="150"
   width="20" color="#222325"></line>
4   <line x1="80" y1="140" x2="80" y2="210"
   width="20" color="#222325"></line>
5   <line x1="80" y1="200" x2="160" y2="200"
   width="20" color="#222325"></line>
6 </pa>
```

<pa> <hp> <line> <ellipse> <circle> <text> <style>

<https://pictogramming.org/apps/pictagramming/>

# Pictagramming

## Name

- Pictogram + Tag

## URL

- <https://pictogramming.org/apps/pictagramming/>

## UI

- Inherits the UI of Pictogramming Series

## Function

- Download pictogram image
- Download and upload code
- Share information containing the code as URL

# Pictagramming

## Demonstration

<https://pictogramming.org/apps/pictagramming/>

# Pictagramming (HPML)


## HPML (Human Pictogram Markup Language)

- Markup language for creating pictogram
- 5 tags
  1. `<pa>` : Pictogram Area
  2. `<hp>` : Human Pictogram
  3. `<line>` : Line
  4. `<ellipse>` : Ellipse
  5. `<text>` : Text



# Pictagramming (Attributes of HPML)

Attributes defined based on instructions and variables of Pictogramming Series.



Watch your step!

PICTAGRAMMING

```
1 <pa type="a" scale="1" background-color="#ffffff">
2   <hp x="20" y="30" scale="0.6" body="60"
   lua="-120" lla="45" rua="45" rla="90" lul="20"
   lll="-60" rul="45" rll="-60" color="#222325"
   orientation="front"></hp>
3   <line x1="-160" y1="150" x2="80" y2="150"
   width="20" color="#222325"></line>
4   <line x1="80" y1="140" x2="80" y2="210"
   width="20" color="#222325"></line>
5   <line x1="80" y1="200" x2="160" y2="200"
   width="20" color="#222325"></line>
6 </pa>
```

<pa> <hp> <line> <ellipse> <circle> <text> <style>

# Pictagramming (Attributes of HPML)

## List of HPML tag's attributes

- `<pa>`  
`type, scale, background-color`
- `<hp>`  
`x, y, scale, angle, body, lua, lla, rua, rla, lul, lll, rul, rll, color, orientation`
- `<line>`  
`x1, y1, x2, y2, width, color`
- `<ellipse>`  
`x, y, width, height, angle, color`
- `<text>`  
`x, y, color, font-size, font-family`

# Pictagramming (HPML + HTML)

**HTML** can be used in addition to HPML to create contents including pictograms and texts.



CAUTION

Watch your step!  
お足元にお気をつけください

PICTAGRAMMING

```
1 <div id="wrapper">
2   <h1>CAUTION</h1>
3
4   <pa type="a" scale="0.7">
5     <hp x="20" y="30" scale="0.6" body="60"
lua="-120" lla="45" rua="45" rla="90" lul="20"
l1l="-60" rul="45" r1l="-60" color="#222325"
orientation="front"></hp>
6     <line x1="-160" y1="150" x2="80" y2="150"
width="20" color="#222325"></line>
7     <line x1="80" y1="140" x2="80" y2="210"
width="20" color="#222325"></line>
8     <line x1="80" y1="200" x2="160" y2="200"
width="20" color="#222325"></line>
9   </pa>
10
11   <div class="message">
12     <div>Watch your step!</div>
13     <div>お足元にお気をつけください</div>
14   </div>
15 </div>
16
17 <style>
18 div#wrapper {
```

Watch your step!

<pa> <hp> <line> <ellipse> <circle> <text> <style>

# Pictagramming (CSS)

Created pictograms by specifying attributes of HPML tags.

However, Pictograms can also be created by **applying CSS to HPML tags**.

- Property names and values are same as HPML tags' attribute names and values, and processing is also same.
- Description using HPML tags' attributes takes priority when both HPML tags' attributes and CSS are described.

# Pictagramming

## Demonstration

<https://pictogramming.org/apps/pictagramming/>

# Outline

1. Background
2. Previous Research: Pictogramming Series
3. Pictogramming
4. Classroom Practice and Evaluation
5. Summary and Outlook

# Classroom Practice and Evaluation

## Dates

- April 26, 2024, and May 10, 2024

## Subjects

- 78 first-year university students who were taking “Introduction to Information Science,” course in the Faculty of Social Informatics at Aoyama Gakuin University

## Class schedule

- April 26, 2024
  1. Lecture on information design and pictograms (15 minutes)
  2. Explanation of how to use Pictagramming (15 minutes)
  3. Creation of original Pictagramming works (due May 10, 2024) (35 minutes)
- May 10, 2024
  4. Questionnaire survey (5 minutes)

# Classroom Practice and Evaluation

## Two questionnaire surveys

- Questions based on the **System Usability Scale (SUS)**
- Questions about **class** and **interests** in HTML, CSS, etc

## Perspectives of evaluation

- Evaluation of usability by using System Usability Scale
- Evaluation of class design using Pictagramming and feasibility of implementation



# Classroom Practice and Evaluation

System Usability Scale score was **56.31**.

Q	Content	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	I think that I would like to use this system frequently	1	5	31	35	6
2	I found the system unnecessarily complex	4	40	16	14	4
3	I thought the system was easy to use	2	7	16	42	11
4	I think that I would need the support of a technical person to be able to use this system	2	17	21	31	7
5	I found the various functions in this system were well integrated	0	4	12	52	10
6	I thought there was too much inconsistency in this system	6	30	24	13	5
7	I would imagine that most people would learn to use this system very quickly	2	10	18	39	9
8	I found the system very cumbersome to use	3	29	22	18	6
9	I felt very confident using the system	8	16	36	14	4
10	I needed to learn a lot of things before I could get going with this system	3	15	22	32	6

# Classroom Practice and Evaluation

System Usability Scale score was **56.31**.

Q	Content	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	I think that I would like to use this system frequently	1	5	31	35	6
2	I found the system unnecessarily complex	4	40	16	14	4
3	I thought the system was easy to use	2	7	16	42	11
4	I think that I would need the support of a technical person to be able to use this system	2	17	21	31	7
5	I found the various functions in this system were well integrated	0	4	12	52	10
6	I thought there was too much inconsistency in this system	6	30	24	13	5
7	I would imagine that most people would learn to use this system very quickly	2	10	18	39	9
8	I found the system very cumbersome to use	3	29	22	18	6
9	I felt very confident using the system	8	16	36	14	4
10	I needed to learn a lot of things before I could get going with this system	3	15	22	32	6

# Classroom Practice and Evaluation

System Usability Scale score was 56.31

- Usability of Pictagramming needs to be improved, because score of 70 or higher is generally desired to satisfy minimum level of user satisfaction.

# Classroom Practice and Evaluation

## Result of Questions about class and interests

Q	Content	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1	Your motivation to learn HTML was increased.	5	6	6	43	16	2
2	Your motivation to learn CSS was increased.	5	6	9	42	14	2
3	You enjoyed this class.	1	1	4	23	29	20
4	This class was difficult.	1	7	17	22	21	10
5	You agreed with the concept.	0	3	8	37	25	5
6	Your interest in web content creation has deepened.	0	6	8	28	29	7
7	Your interest in pictogram has deepened.	0	1	8	28	29	12
8	Your interest in information design has deepened.	1	2	4	26	37	8
9	You were able to create the work that you wanted to create.	1	8	13	27	23	6
10	Free to write your impressions of this class. (open question)	-	-	-	-	-	-

# Classroom Practice and Evaluation

## Result of Questions about class and interests

Q	Content	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1	Your motivation to learn HTML was increased.	5	6	6	43	16	2
2	Your motivation to learn CSS was increased.	5	6	9	42	14	2
3	You enjoyed this class.	1	1	4	23	29	20
4	This class was difficult.	1	7	17	22	21	10
5	You agreed with the concept.	0	3	8	37	25	5
6	Your interest in web content creation has deepened.	0	6	8	28	29	7
7	Your interest in pictogram has deepened.	0	1	8	28	29	12
8	Your interest in information design has deepened.	1	2	4	26	37	8
9	You were able to create the work that you wanted to create.	1	8	13	27	23	6
10	Free to write your impressions of this class. (open question)	-	-	-	-	-	-

# Classroom Practice and Evaluation

Question 1 and Question 2 (willingness to learn HTML and CSS) were particularly poor results.

- Because it was **information design** class, not HTML and CSS.
- They doesn't feel that they were learning HTML and CSS because it was possible to create pictograms by changing the values of the codes entered by default.

Excerpts from Question 10 (open question)

- “The operation method was **simple and easy to handle**, and I found it **interesting to create pictograms intuitively**.”
- “It was difficult to think of ways to **make them easy to understand** in creating the pictograms.”
- “It was difficult at first, but **as I got used to it, I enjoyed being able to create what I wanted to do**.”
- “It was **difficult regarding the coordinates**.”

# Classroom Practice and Evaluation

Although usability needs to be improved,  
Pictagramming is expected to enable  
efficient and enjoyable web production practice.

# Outline

1. Background
2. Previous Research: Pictogramming Series
3. Pictogramming
4. Classroom Practice and Evaluation
5. Summary and Outlook



# Summary and Outlook

## Summary

- Developed and evaluated “Pictagramming,” for learning document structuring and styling through pictogram content creation.
- Pictagramming can be used to realize efficient and enjoyable web production practice.

## Outlook

- Improve usability.
- Repeatedly conduct classroom practice, evaluate, analyze, and verify education effectiveness.