E-Paint

Programming 3 Java Project

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Introduction

E-paint is a collaborative paint program which runs on a server implemented in Java programming language to let two users draw a same image being anywhere with internet access .

It has a clean and easy to use GUI(Graphical User Interface).
The source code is a mixture of two classes the MainBoard(Paint Board with a Server) and LineStroke(Every drawing input by the user).The code is made to record all the user drawing input and store in containers to draw it later.The container is an ArrayList of type LineStroke.LineStroke class tells wether the input is a line or a path depending on the tool which user used.

The server is a basic Java.net server which uses sockets and work on their ObjectOutputStream and ObjectInputStream respectively to communicate. The program also works with a serializer to be compatible with ObjectStreams.

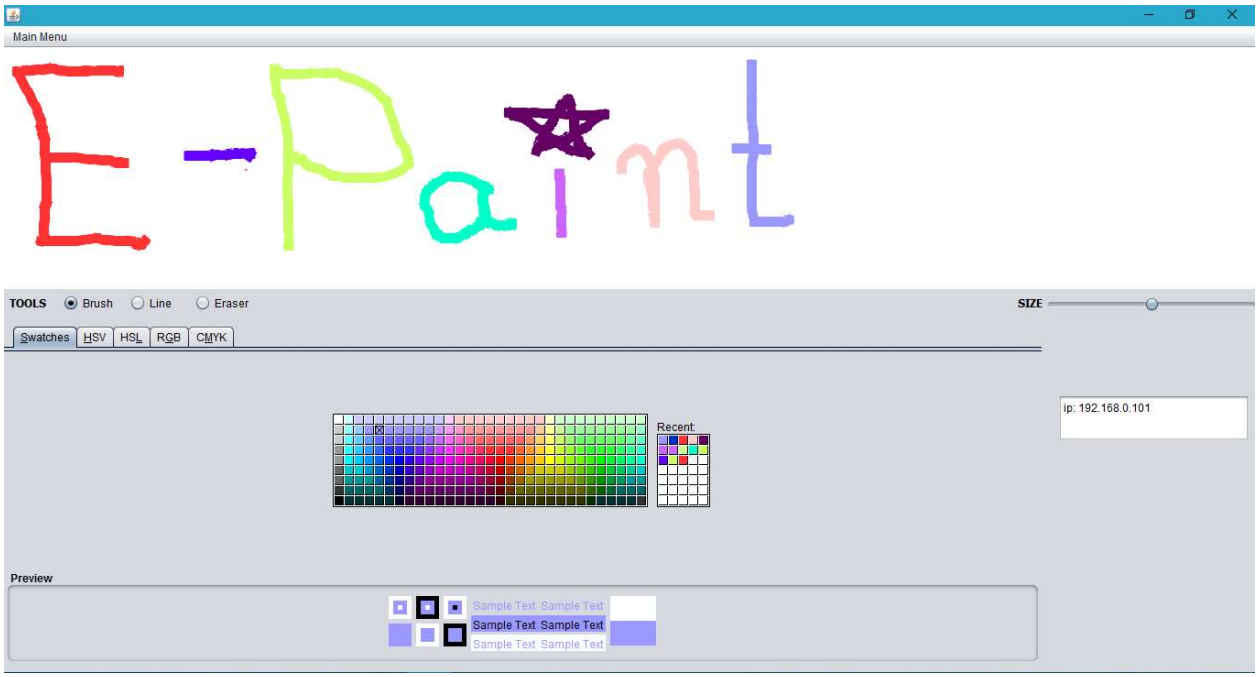
The server has a host and a single client which communicate with each other and send their drawing input and the program draws the image .

Users are allowed to start as a host or connect as a client.

Users can export the image as different picture formats.

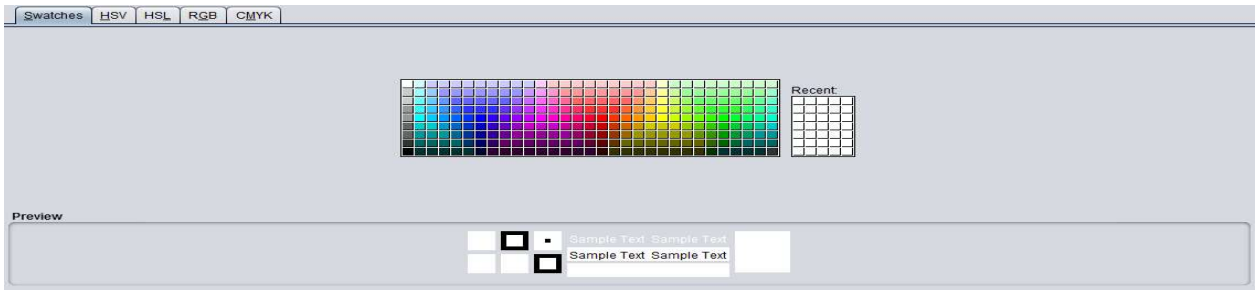
On exit they are prompted to save if something new is drawn

Program Interface



The interface is mostly contained of a DrawArea on a JPanel component.

A color chooser with a lot of options to make easy for the user to choose the color of their choice with a preview to see how the color looks like finally.



A display tab to show the current IP the program is drawing.

An option pane to choose between 3 tools: Brush, Line and Eraser.

A size slider to choose the the size of the drawing pointer .

A drop down menu with components :

1. New Image : It starts the user as a host and prompts to input the server port.It removes the all previous work done in offline mode. New streams are made and sockets are allowed to be accepted.
2. Join : It starts the user as a client and prompts to input the server port and the IP address of the host it wants to connect.It draws all the previous drawings the host side made online.New streams are made and searchs for the input address and waits to accept.
3. Undo: It removes the last input drawing from the user.
4. Save: It saves all the input of mouse events on the DrawArea in an XML file .
5. Export: It saves the image on the DrawArea in many picture formats as the user wants.
6. Exit : It quits the program and asks if the user wants to if some changes are made.

Input And Output

User is allowed to draw in the DrawArea.The input is handles by the mouse events done by the user.As the mouse is clicked the graphical frame of type Graphics2D is made if its not present and the start coordinates are recorded and draws any present inputs in the containers.

When the mouse is dragged it records all the coordinates, the end points and draw all the present inputs in the containers.Antialiasing is used to smooth the edges.

When the mouse is released the program stores all of the details of strokes user made and draws all the input.It also checks wether the user is client or host and handles the ObjectOutputStream as mentioned.
The streams are flushed and the its send to the other side to get drawn.

The ouput is handled by a Drawall(Graphics g) function which loops through all the inputs made by the user on the DrawArea with respect of their types.Graphics g is casted to Graphics2D and drawn on it with specific details like color and the size mentioned by the user.On console for the users convenience the container size is printed to observe multiple objects on Object Output Streams going on through which make connection slower.

Program Structure

The program has two classes overall:

1. **MainBoard.java :** It is the core class of the whole program with the GUI ,Server implementation ,Input/Output handling and Drawing.

<u>It has private elements:</u>

- private Stroke s: It is a temporary Stroke element to change the size of the drawing pointer
- private static final long serialVersionUID = 1L : It is the serial version ID to let the program use the ObjectStreams.
- int port:It is the client socket port.
- String ip :It is the IP address on which the server runs.
- int xStart: It is the temporary start x-coordinate of the mouse.
- int yStart: It is the temporary start y-coordinate of the mouse.
- int xEnd: It is the temporary end y-coordinate of the mouse.
- int yEnd: It is the temporary end y-coordinate of the mouse.

- final String filepath = "Image.png": It is the temporary and default name for the image file.

- Line2D lineBuffer: It is the temporary lineBuffer for the line tool.

- Path2D path: It is the temporary path for the brush tool.
- Path2D epath: It is the temporary path for the eraser tool.

- Graphics g: It is the draw area element for the Jpanel drawing.

- int exitChange: It is a counter to see if something new is to be saved.

- List<LineStroke> lineContainer: It is the LineStroke container of all the Inputs by the user.

- ServerSocket serverSock:It is the host socket for the server.

- ObjectInputStream OIS: It is the object input stream for communicating over the server.

- ObjectOutputStream OOS:It is the object output stream for communicating over the server.

- Socket sock: It is the client socket for the server.

- isHost: It is used to determine if the user is host or not.

- isClient: It is used to determine if the user is client or not.

2. **LineStroke.java:** It is the class of each input of the user

It has private elements :

- Colour clr : It is the chosen colour by the color chooser.
- Integer sze : It is the size from the size slider.
- Line2D linebuffer : It is the component if the line tool is selected.It contains all the information about a specific line.
- Path2D path : It is the component if the brush tool is selected,It contains all the points of the input.

It has public functions:

- LineStroke(Color col, int siz, Path2D pth) : This function is used as a constructor for the brush tool and sets the mentioned private elements.
- LineStroke(Color col,int siz ,Line2D lin):This function is used as a constructor for the line tool and sets the mentioned private elements.
- int getSize():This function is used to get the size of the mentioned LineStroke element in the program.
- Color getColor():This function is used to get the color of the mentioned LineStroke element in the program.
- Line2D getLinebuffer():This function is used to get the linebuffer of the mentioned LineStroke element in the program.
- Path2D getPath():This function is used to get the linebuffer of the mentioned LineStroke element in the program.

Improvements And Extensions

- Flickering drawing sometimes.
- Eraser removes after mouse released.
- Antialiasing increases the flicker but make it looks smooth.
- Some functions were not implemented because of time critical situations.Apologies.

Difficulties

There were some difficulties with the server synchronization but were fixed later by research and hit/trial.

Conclusions

E-paint is a collaborative paint program which runs on a server implemented in Java programming language to let two users draw a same image being anywhere with internet access .

References

- The Internet
- Stackoverflow.com
- Google.com
- Wikipedia.com
- Oracle.com
- Netbeans Documentations