gimp

Elective 1: Media Spezialization
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Introduction

Gimp is an open source software for high-end image processing. Although it is not meant to be a vector program, a path function is quite useful for image processing and needed very often for masking. Gimp has already a path tool, but this needs some improvement.

Assignment

The assignment is to develop an easy, fast and intuitive way to create paths, vectors and shapes. The tool should provide fast and individual ways to work with paths. It shall be included fluently into the workflow in Gimp.

Expert´s evaluation

Though the vector tool in Gimp (c.f. ill. 1) is not the main part of the software, it is very deficient at the moment. Most important, you're not able to create real vector layers. So the tool is more about creating a selection than about working with paths and vectors. Once you've filled the selection, you cannot change it anymore like a vector, as it is just pixels. Moreover, the handling of the tool is quite inconvenient. There are different modes you can select from checkboxes (c.f. ill. 2), once for making polygons or bezier curves, and to decide if you want to design, edit or move your path. What is missing at all are simple basic shapes that are needed and used very often also in image processing programs like circles, squares or rectangles. So we decided for our concept to implement some more functionality with the focus on the usage for image processing, and to make the handling more intuitive and faster.

ill. 1: The path tool in Gimp
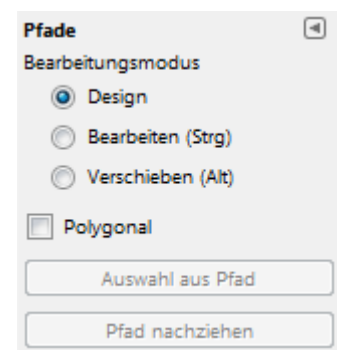
ill. 2: The path tool in Gimp

Functionality

A path tool needs more functionality than just creating paths. Following functionality could be implemented.
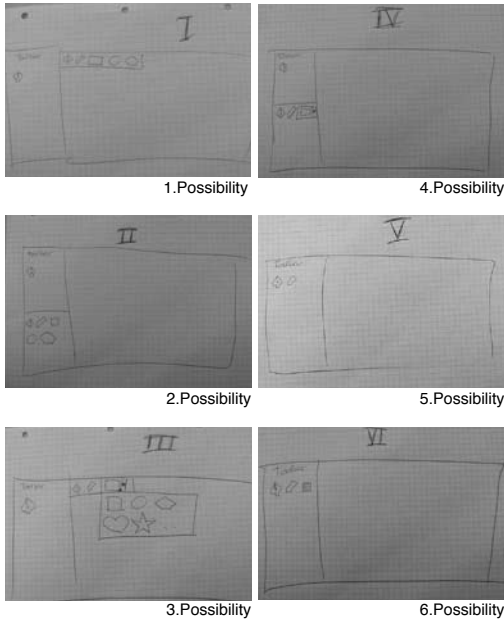
Create paths (bezier/polygons)
Create basic shapes
_ Rectangle
_ Square
_ Circle
_ Eclipse
_ Arrows
_ Stars
_ Hearts
_ ...
Create freehand forms
Edit paths
_ Scale path
_ Rotate path
_ Reflect path
_ Delete paths
_ Move paths
_ Edit anchor points
_ Add anchor points
_ Delete anchor points
_ Move anchor points
_ Edit handles
_ Edit strokes
_ Curve stroke
_ Delete stroke
_ Move stroke
_ Fill path
_ Fill color
_ Fill opacity
_ Fill pattern
_ Outline
_ Outline color
_ Outline opacity
_ Outline style
_ Outline number
_ Outline edges
_ Round corners
_ Number of edges
_ Degree of angles
_ Create vector layer
_ Make selection from path
_ Make path from selection
_ Combine paths
_ Divide paths
_ Exclude paths
_ Intersect paths
_ Arrange paths
_ Make mask from path
_ Save path as basic shape in library
_ Render path into pixles
_ Perspective
_ Z-index

Brainstorming Ideas

1.Possibility   4.Possibility

2.Possibility   5.Possibility

3.Possibility   6.Possibility
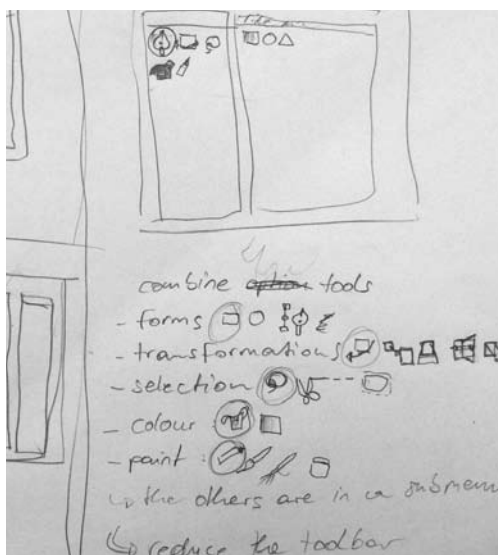

Sketch of combining tools

1. Toolbar

The Toolbar could be reduced or extended. The first possibilty is to have just the path icon visible. After activating the icon, a sub menu appears on the canvas where you can choose "path", "freehand", "rectangle", "circle" and "polygon". The second is quite similar to the first one. The difference is that the submenu isn´t on the canvas, but under the tool bar. The third possibility is to have a submenu on the canvas after clicking on the icon and than you can chose "path", freehand" or "simple shape". If you click on "simple shape" another menu will be opened and there you can choose different simple shapes, like circle or polygon. The fourth idea is quite similar to the third but the submenu is under the toolbox. The fifth possibility is to have just a path tool and a freehand tool and the sixth is to have three tools, the path, the freehand and the simple shapes.
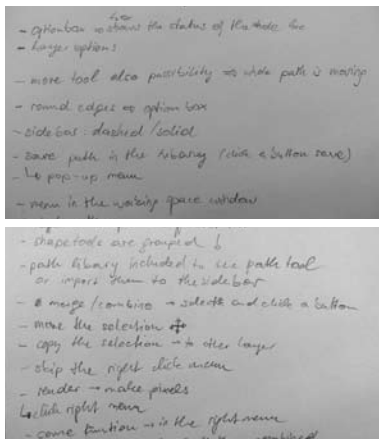
2. Combining tools

Combining tools is forced to reduce the toolbar with all the different tools. It is an attempt to combine different toosl logically and comprehensibly.

- Forms: Rectangle, circle, polygon and path
- Transformations: Rotate, move, scale, perspective, shear, reflect
- Selection: Lasso, magnetic scissors, rectangular- and circle-selection
- Paint: Pencil, brush, airbrush, calligraphy, eraser
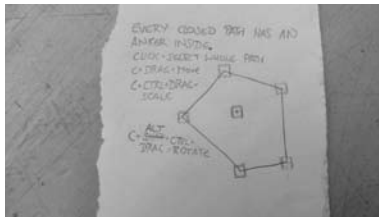- Colour: Fill, gradient

The colour tools could be implemented also into the properties menu. So the toolbar is reduced to only 4 or 5 icons. All the others are in the submenus of the main tools.

3. Path tool / Simple shapes

Create Layer
_ automatically a new layer while creating a new path
_ multiply layer, more paths and therefore z-index for path (right click for up / down)

Activating / deleting layer
_ is the layer active is the path also active - you can delete
_ Layer options - Optionbox shows the status of the whole layer

Path libary
_ save path in the Libary (there is a button save, or this function is apearing in a pop-up menu)
_ is included to the path tool or you can import them to a sidebar

Handling the path
_ move tool - whole path is moving
_ every closed path has an anchor inside
_ functions: click = select whole path, click+drag = move, click+ctrl+drag=scale, click on the stroke =add anchor point, click & press delete = delete, click & drag handles = round strokes

Tool settings
_ menu of the tool settings on the canvas
_ different shapes as different tools
_ simple shape tools as different tool

Merge / Combine
_ select and click a button
_ buttons in the layer menubar - merge / combine / intersect
_ in the mainmenu a menupoint - path - combine / intersect ...

Notes from the brainstorming


Sketch of a path and a optionmenu

Concept

Rising from all of the during the brainstorming developed ideas this concept has been created. To make the vector-tool interwoven with the actual Gimp-toolset, but not to intersect, a collection of vector-based tools has to be implemented. These include a tool for simple geometric shapes, one for bezier- and polygon-drawing and a freehand-sketching-tool. All of these instruments intend a different access to vector-based drawing. The most custom drawing approach is the Freehand Tool. Similar to the Free Select Tool it provides direct drawing on the canvas with a computer-mouse, or other proper input-devices. The curser-movement is now recorded and in realtime converted into a vector-path.

For quick access to basic shapes the Simple Shapes Tool offers a collection of prebuilt basic shapes like a rectangle, ellipse and triangle, but too a set of more complex shapes like a polygon, star and furthermore the ability to save a custom library.

A maybe more precise and planed way to draw is performed with the Paths Tool. Through Click and Drag or just Clicking the kind of Point / the point-handles can be defined while drawing. So this instrument is capable of drawing soft bezier-curves and hard-edged polygon lines.

Due to Gimp offering a foundational set of transformation tools, these are able to change a vector-curve in a way analog to the pixel-orientated behavior. This includes scaling, rotation, mirroring, shearing and perspectively deforming.
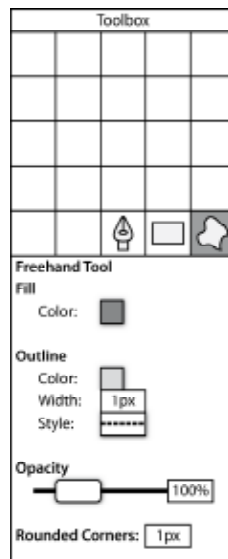
**1. Schema for the three new icons in the tool bar**

The Freehand Tool provides settings for the object drawn next/which is drawn at the moment.

Fill: The color of the area defined by the vector. If the vector-path is closed the borders of the shape's area are defined by the path. If not, the area is defined as if the end-points would be connected with a straight line.

Outline: The appearance of the drawn vector-curve. Defined are the width, color and style of the line. Style in this case refers to being a solid or dashed line.

Opacity: The opacity of the shape's fill and outline. Subjacent elements get visible through the shape when decreasing this value.

Rounded Corners: Softens edges of the drawn path. A freehand drawn rectangle's corners would turn to radius. This value stays changeable and can be used to smooth a path.
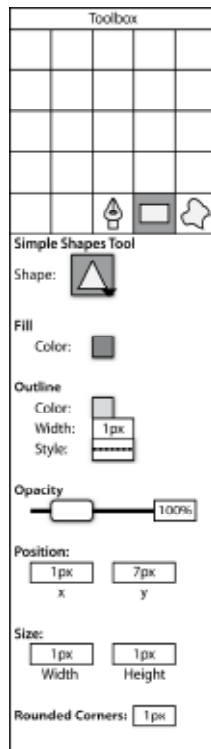
2. Simple shapes tool

The Simple Shapes Tool uses the same standard settings as the Free-hand Tool, including fill- and outline-settings, opacity of the shape and the amount of corner rounding, which can be set to zero to deactivate it. Furthermore the instrument offers a shape definition. This working in the same way as the Brush-chooser displayed when drawing with the Pencil Tool. When a click on the shape-chooser is performed a popup will open, affording a set of pre-installed basic shapes and saved custom shapes, which is synchronized with a dockable dialog.
Position: The coordinates of the shapes origin.
Size: The definition of the dimensions of imaginary rectangle containing the whole shape.
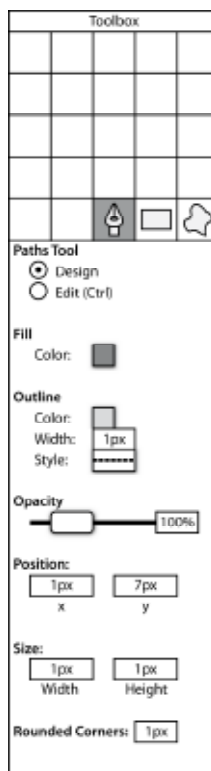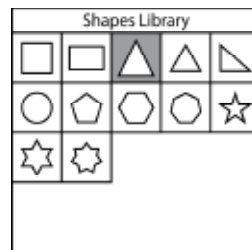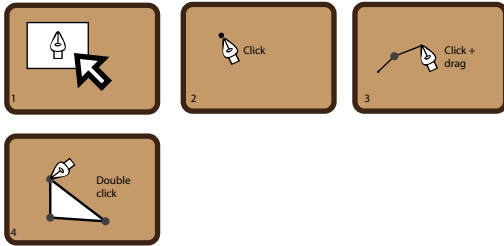

3. Path tool

The Paths Tools' abilities spread into two different tasks: On the one hand it provides a way to draw vector-curves through defining points on the path and their bezier-handles, and on the other hand the tools serves for editing shapes drawn before. For this the Tool Options Menu displays a Design and an Editing mode. In Editing mode (accessible on-the-fly through pressing the Ctrl-key) the points describing the vector-curve can be moved or infinitely variably changed from spike to curve.
Position and size are only displayed in editing-mode to reposition or to scale the shape's bounding rectangle.
Basic shapes originally don't appear as point-defined shapes, but as solid shapes. Through selecting the Paths Tool and clicking on a basic shape the converting step is made, which enables the user to handle it as a normal vector-curve.

Scenarios
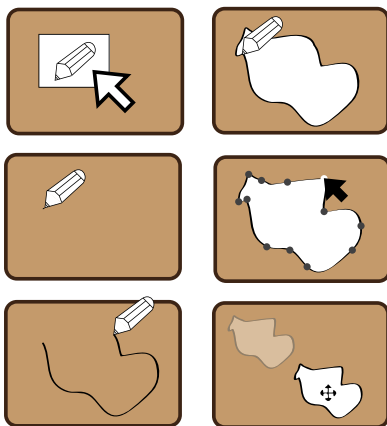

I. How to work with a path tool

1. Click on the path tool. (1)
2. Select colours and line style.
3. Click on the screen where you want to start drawing (2).
4. If necessary select the curve (3).
5. Create more anchors and you can close the path with double click on the start anchor (4).
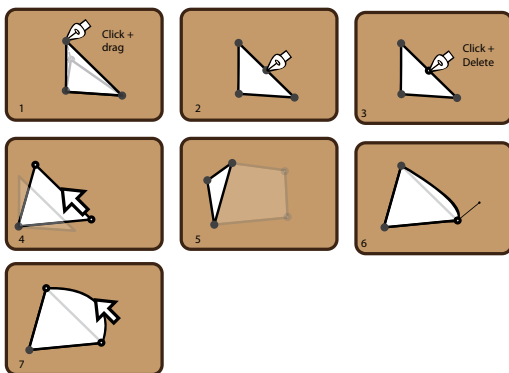
II. Edit a path


When you created a path you still can edit it.
1. Clicking on an anchor and move it somewhere else (1).
2. Add a new anchor by clicking on the stroke (2).
3. Delete an anchor by click on the anchor and press the delete button (3).
4. Select more anchors and move them (4).
5. Delete a stroke by click on it and press the delete button. (5)
6. Edit the curve by click on an anchor and move one of the handles. (6)
7. Edit the curve by clicking on a stroke and move it. (7)

III. How to work with the freehand tool

As a designer you just want to draw a shape and modify it later for example with a tablet. The working is quite similar to the normal path tool.

1. Select the Freehand tool.
2. Select colours and line style.
3. Click on the screen and start drawing.
4. You can stop whenever you want and when you want to close it, you just go back to the starting point. It doesn't have to be precise. As long if it is really close to it.
5. When you stopped, it is just a normal vector layer but all the curves are managed for you.
6. When you want to add, edit or remove anchors it is the same like the path tool.
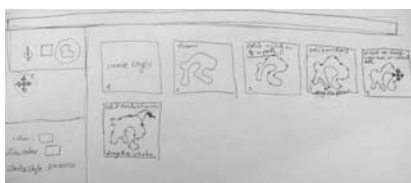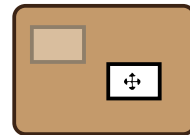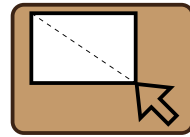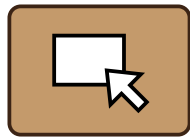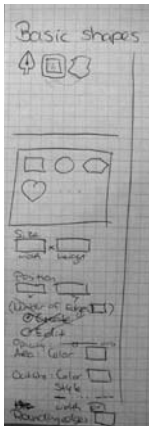
## IV. Create a simple shape and adjust it to your own needs

1. You go to the toolbar and select the shape tool.
2. You get different shapes you can choose.
3. We will pick a rectangle.
4. Now we got the option to give a size and position.
   In this case we left it option.
5. Other options are fill colours, border style and rounding edges.
6. We now select begin point by hold click on the screen.
7. Now we move over the screen to the end point and let unclick our mouse button.
8. When you do that we create a vector layer in the current layer you working in.
9. We now created a rectangle and we can move it now over the screen.
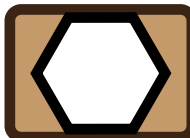
V. Create other shapes like polygon

For other shapes you have the same instructions.

1. Now we don't select a rectangle but a polygon.
2. We still can give a position and size if we want.
3. The only difference now with the options is an addition option: number of edges.
4. We select 6 but you are free to choose a number of edges.
5. We can now draw the polygon on the screen just like the rectangle.
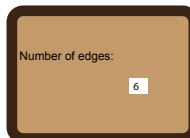
VI. Drawing a simple shape
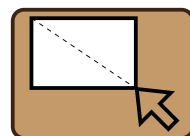
Adding a basic shape to the canvas somehow seems as choosing a proper cookie cutter out of a box. The box is opened through a click on the Simple Shapes Tool-Button, where, in a second step a figure may be chosen, if it is not the same as the one created the last time (last selected Simple Shapes stay pre-selected).

When the right shape is selected, it can be drawn on the canvas through click and drag, which defines the bounding rectangle of the chosen vector-shape (at least in most cases).

After the simple shape is created, with the pre-setup fill- and outline-settings, it stays selected and configurable, because of the Tool Options Menu now belonging to the selected shape. So the basic settings can be immediately edited and furthermore the shape can be modified in the same way, when working with the Rectangle Selection Tool. Only a click on the canvas outside the shape deselects the old Simple Shape and directly starts the creation of a new one.
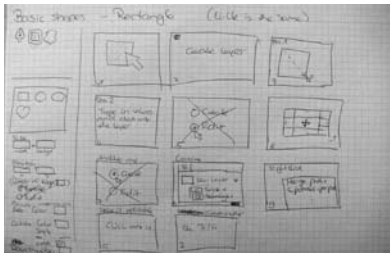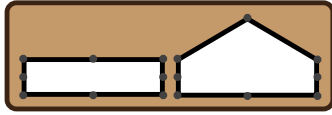
VII. Edit a basic shape

When you created a basic shape you can simple change it with the path tool. For example when you want to change a rectangle it starts already with 8 anchors what you can move.

1. We start with a normal rectangle and we want to have it like a house.
2. We can easy move one anchor a little bit higher and the shape change like what you see in the picture below.

VIII. Managing vector layers

ADD

SUBSTRACT

INTERSECT

EXCLUDE

As we know vector layers exists in a normal layer. In the picture below we see a layer with 3 vector layers inside it.
We can do different things with it like ordering it, put it in groups but we can also do more complex stuff with it like mathematical functions.

- Z-index
1. Managing z-index of a layer can be happen in two ways.
   By selecting on screen and say on top or on bottom. And you can man age it in the layer tab. In our example choose the second one.
2. When you want to have a vector layer on a specific place you click on it.
3. Now you move it to the right position and unclick you mouse button.

- Grouping
1. Grouping is just like normal grouping of layers except this group is inside a normal layer and groups vector layers.
2. Creating a group works and is the same button as for normal groups.
- Mathematical functions
a.) Add: Paths are merged to one path with only one outline
b.).Substract: Substracts the path on top from the path below
c.) Intersect: Part of the path which is covert from both paths
d.) Exclude: Part of the path without the part which is covert from both paths