Weibel Project version 9

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This project uses ObjectJ in combination with ImageJ to perform integrated grid counting across many images. A grid (Fig 1) is shown as overlay. In this application, the end points of the grid lines are used to assign categories with text overlay. 45 category strings in 6 colors can be used to mark grid positions with single or dual key strokes. The mouse is used to locate and the keyboard (not mouse button) tis used to assign and mark the desired grid positions (two-handed acquisition).

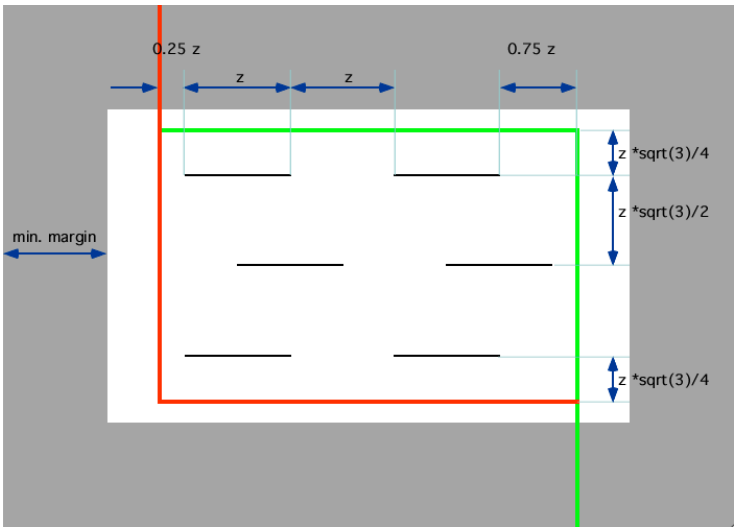

Fig 1: An equilateral triangular grid (black) is used which is synchronized with the frame (red-green). The frame is centered in the image and has the required minimum distance to the image borders; here the margin area is colored gray.

New features in version 9

The new "Label" feature in ObjectJ is used to show text labels. Max 45 custom labels are available via single or dual-key shortcuts. Three different modes for fastest possible marking are supported.

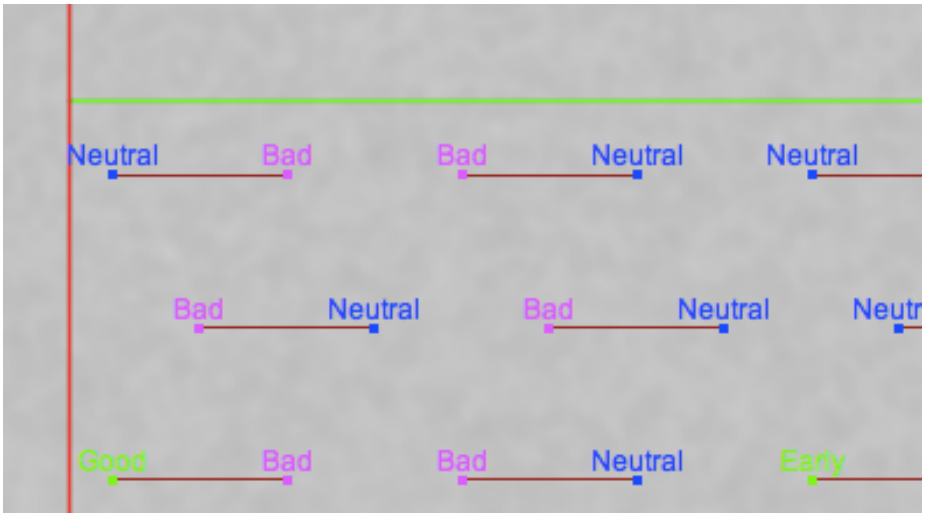

Fig 2: Categories shown as text overlay

New Label feature in ObjectJ

The new project introduces an ObjectJ feature that allows a linked column to be used for non-destructive text labels that appear on the image. The column contents as shown in "ObjectJ>Show ObjectJ Results" can be made visible via a right-click on a column's title . In this project, this is already done via macro.

Numeric Label and Size

The visibility of the numeric label and font size can be cotroled via ObjectJ Tools> Sizes…

Single- and dual-key shortcuts:

In this discussion we limit shortcuts to numeric keys (0..9). Using letters is possible but not discussed here.

Panel of Categories

This panel (Fig 7) is an image showing all available categories (with code, label and color) as rows, so the user has a quick overview of all codes and their labels. In the panel, you also can define a category that is assigned to the Joker key [J].

Example: 5 single-digit and 40 dual-digit shortcuts

key 0	(not used as single key)
key 1..5	5 categories using single digit (for frequent categories)
keys 60..99	40 categories using dual digit (for less frequent categories)
key R	repeats the most recent category
key J	Joker category
key K	Kills closest point or entire swatter group

The first numerical keystroke defines whether one more digit is needed, for example if '6' is pressed, one more digit 0..9 is expected within 1.5 sec in order to define category 60..69.

Joker [J] and Repeat [R] Key

If a dual-key category appears to occur more frequent, it can also be marked with a single key, either by pressing 'R' to repeat the most recent category, or by pressing 'J' to use the current Joker category. The joker can be re-defined by activating the Panel, locating the cursor upon a category and pressing 'J'.

In order to expand the number of categories beyond 10, double-digit shortcuts are supported.

Changing Macro Variables

You can change the key table (see below) and other parameters via ObjectJ>Show Embedded Macros. After the change, click "Install Embedded Macros" and optionally choose ObjectJ>Save Project.

KeyTable

The embedded macro set contains a keyTable, that relates codes (such as '4' or '66') to item types and labels. Below, five labels (Good, Bad, Neutral, Early, Late) are defined, some of which (e.g. Good and Early) share the same item type and thus color.
Example for a KeyTable:

```
keyTable = "";
keyTable += "#1,  A, Good     ";
keyTable += "#2,  B, Bad      ";
keyTable += "#3,  C, Neutral  ";
keyTable += "#66, A, Early    ";
keyTable += "#67, B, Late     ";
```

In the example above, pressing key '1' will set a point of type 'A' (green in the example project) and show up as label "Good". In this example, 'A' must be one of the Item types shown in ObjectJ>Show ObjectJ Tools or ObjectJ>Show Project Window/Objects.

Background Color

Label strings on the images can be drawn with or without background.
Examples:

```
backgroundColor="none",  //No background
backgroundColor="yellow",  //yellow background
backgroundColor="#8000ff00", //semi-transparent green
```

Numerical Key Pad

If keys on the numerical keypad should be used, change the corresponding lines in the embedded macros
<u>from:</u>

```
macro "<Key>1 [1]"{ doKey(1); }
macro "<Key>2 [2]"{ doKey(2); }
macro "<Key>3 [3]"{ doKey(3); }
…
```

<u>to:</u>

```
macro "<Key>1 [n1]"{ doKey(1); }
macro "<Key>2 [n2]"{ doKey(2); }
macro "<Key>3 [n3]"{ doKey(3); }
…
```

Three modes for marking

(i) In the "Focus Mode", the user is guided by a magenta "Focus" circle which shows the current free grid point. After marking via single or dual key, the focus will advance to the next free grid position. It also can be dragged to a different starting point.

(ii) In "Swatter" mode (showing green brush area), all free grid points inside the swatter area can be marked via single or dual digit, or

(iii) In the "Random Access Mode" (Grid = on, Focus = off, Swatter = off) can the user position the cursor anywhere and mark the closest free Weibel position via single or double digit.

Menu Commands:

Initialize Grid [F3]
This is necessary before marking a different window.

Key 0..9
Evaluates key strokes. These menu commands must be invoked by key shortcuts, not via menu.

Key R
Repeats the most recent category. This menu command must be invoked by key shortcut, not via menu.

Key J
Marks cursor position with Joker category, as shown in the Panel. This menu command must be invoked by key shortcut, not via menu.

First Focus [F]
First empty Weibel location is highlighted with magenta circle.

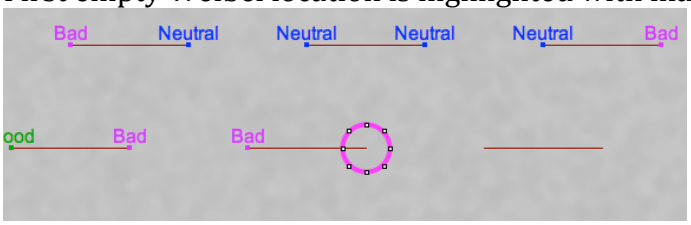

Fig. 3: Focus mode

Next Focus [G]
I no focus ROI is visible, it is shown on the first empty Weibel point. Otherwise, the focus is moved to next empty Weibel point (Fig 3).

Start/Stop Swatter [S]
Shows or hides the circular brush area (Fig 4). Click inside the brush area and drag towards outside to extend, or click outside drag towards inside to trim. All non-occupied grid points inside the swatter area can be annotated or killed with single or dual-key stroke. Be careful as currently there is no Undo (but you precede the operation with ObjectJ>Save Project).

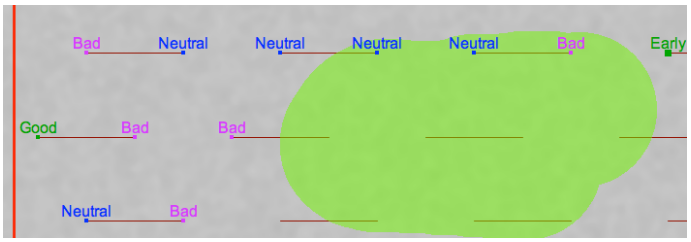

Fig. 4: Swatter mode

Swatter All/ None [A]
Highlights (or unhighlights) the entire frame as swatter area (Fig 5) . This can be used to mark all unmarked gridlocations with a certain category. Be careful as currently there is no Undo (but you precede the operation with ObjectJ>Save Project).

Fig. 5: Swatter All

* **Kill [K]**
If swatter is on, kills all markers in the swatter area. Otherwise, kills the marker that is close to the cursor, similar to the pistol tool.

* **Kill Duplicates**
In the previous version it could happen that a grid point was marked twice. "Kill Duplicates" highlights andy duplicates in a red cirle with the option to kill them sequentially.

Show Panel [P]
Shows the Panel of Categories. Locate the cursor upon a category and press ‘J’ to define the Joker (Fig7).

Show Frequency Table
Shows both a bar graph with relative frequencies, and a table with absolute and relative frequencies (Fig 6). Older tables are closed.

Select None [Shift-Cmd-A]
Can be used to remove both the Focus circle and the Swatter area

(ImageJ>Edit>Selection>Select None)

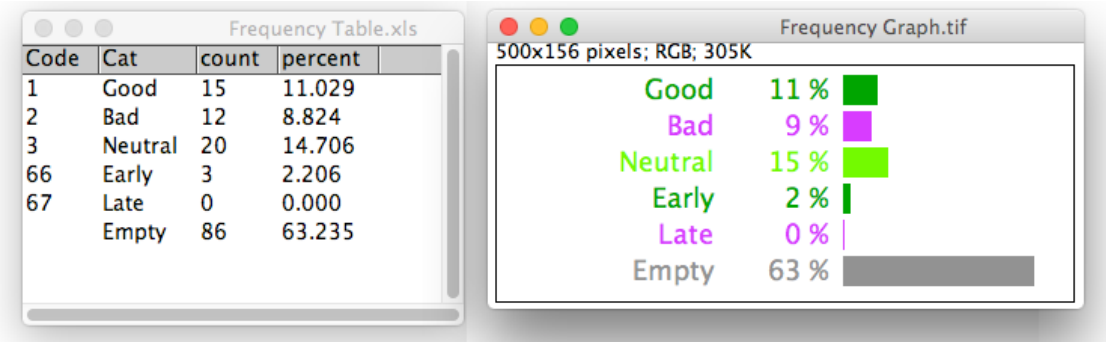

Fig 6: Frequency Graph and Frequency table

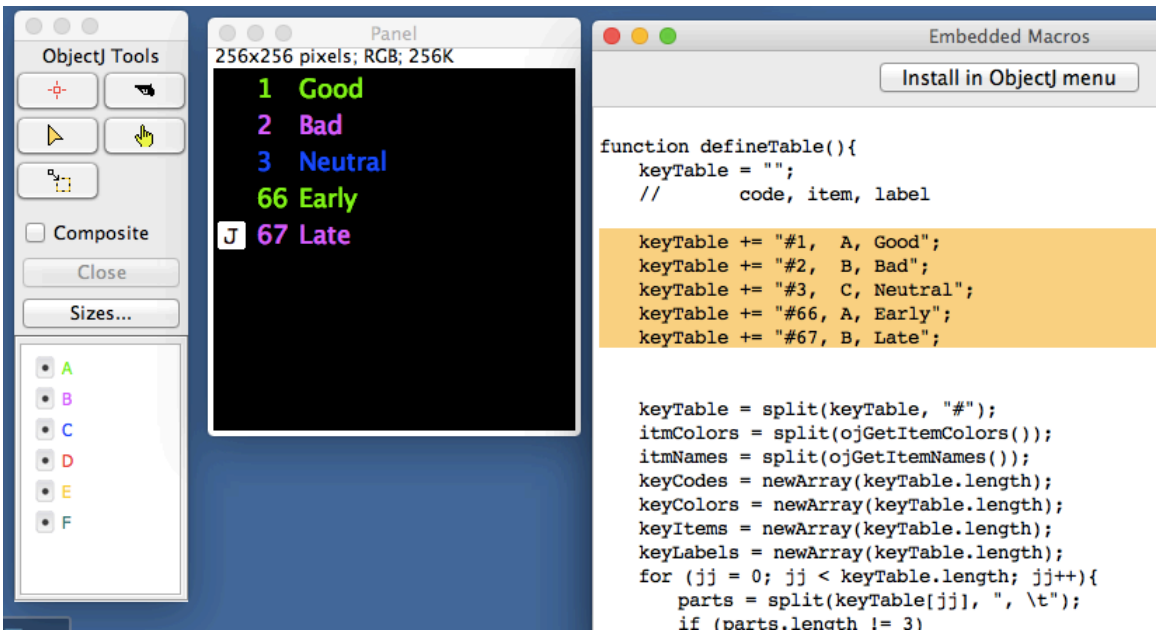

Fig 7: Possible categories are defined in ObjectJ>show Embedded Macros (right) and can be displayed in the panel with the corresponding colors via ObjectJ>Show Panel. For example "Good" is shown in green because it uses the green item type "A". This color can be changed in ObjectJ>Show Project Window: in the "Objects" panel, double-click the corresponding color field.