

Pattern-Driven Navigation in 2D Multiscale Visual Spaces with Scalable Insets

Supplementary Material

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Supplementary Tables

1	2	3	4	5
1. What is your overall impression of the inset techniques? (1: not impressive; 5: very impressive)				
		xxxxx	xxxxxxxxxxx	xxx
2. Do you think the concept of previewing small and aggregated regions as insets within the view is helpful for finding interesting regions? (1: disagree; 5: strongly agree)				
	x	xxxx	xxxxxxxxxxx	xxx
3. How easy was it to learn the interface for the inset techniques? (1: very unintuitive; 5: very intuitive)				
	x	xx	xx	xxxxxxxxxxxxx
4. Are there any parts of the interface that were not intuitive?				
<ul style="list-style-type: none"> • Inset disappearance (4x) • Manually showing insets through clicks on a rectangle • Number confusing as not always visible • Make aggregates dispersable • Foreign terminology (copula) • Enlarge insets on zoom • Inset movement was distracting (inner-placement) • Insets very prominent • Difference between cluster representatives not obvious 				
5. Is there anything else you want to tell us?				
<ul style="list-style-type: none"> • Lower resolution of insets (3x) • Cultural bias needs to be taken into account • Scroll acceleration too fast • Make aggregates dispersable 				

Table S1: Closing questionnaire of the first user study. Each “x” stands for the answer of one of the six participants. The lists for question 4 and 5 have been paraphrased and combined for brevity. All questions were optional.

Participant	Action
P1	<p><i>Started with inner-placement</i></p> <ul style="list-style-type: none"> • Slow panning to gain an understanding of the view and data • Gently zoomed to a inset to investigate context • Panned along the diagonal • Scaled up and down a cluster of two insets to quickly investigate the visual structure of the patterns • Continued panning to search for patterns <p><i>Switched to outer-placement view</i></p> <ul style="list-style-type: none"> • Zoomed out • Identified new pattern type • Assessed original location of the new pattern type through hovering the inset • Panned to another region • Investigated appearance and disappearance of insets based on the zoom level • Scaled up an inset showing a different pattern type
P2	<p><i>Started with inner-placement</i></p> <ul style="list-style-type: none"> • Obtained overview through brief zoom out • Zoomed back in to initial zoom level • Dragged an aggregate of insets away to study context • Rapidly panned down the diagonal of the matrix to find dot-like patterns • Dragged a pile of insets away to study context • Scaled up and leafed through a pile of insets • Down-scaled pile of insets as no dot-like patterns were found • Zoomed out and panned further to gain a better overview • Found a pile of two insets at the corner of a large square-like, annotated pattern • Zoomed into the cluster to inspect neighborhood of the insets • Zoomed out again and kept on panning • Encountered slowness due to large amount of data loading • Leafed through a large pile and found some dot-like pattern • Zoomed into location to explore the local neighborhood <p><i>Switched to outer-placement view</i></p> <ul style="list-style-type: none"> • Scaled up all the piles of insets to search for dot-like-patterns • Found one instance and zoomed into that location • Rapidly panned to other location while searching for dot-like patterns <p><i>Loaded square-like patterns</i></p> <ul style="list-style-type: none"> • Explored and found a square like pattern • Zoomed in and out investigated loss of inset • Zoomed all the way out to look that the square-like patterns globally • Scaled up and leafed through several piles of insets with unexpected variances
P3	<p><i>Started with inner-placement</i></p> <ul style="list-style-type: none"> • Obtained overview through gentle panning and zooming • Adjusted color map of the matrix • Zoomed out to gain a broader overview • Zoomed back in to study details • Dragged pile of insets to see the nearby context • Zoomed into the location containing the insets of the pile • Zoomed out a bit and panned to other locations

Switched to outer-placement view

- Zoomed out a bit and panned to other locations
- Investigated disappearance of an inset
- Panned to another location
- Scaled up a square-like pattern and investigated the detailed visual structure in the inset
- Zoomed out while keeping the inset scaled up.
- Scaled up another cluster of insets with square-like patterns
- Leafed through the cluster to investigate the insets individually as the patterns show some expected details
- Panned to another location
- Scaled up an inset but kept on panning

P4

Started with inner-placement

- Panned rapidly down the diagonal
- Zoomed out to get a broader overview
- Zoomed back in a bit
- Dragged a pile of insets away to assess the occluded context
- Continued panning to find a dot-like pattern
- Scaled up an inset with a dot-like pattern
- Zoomed into the location of the dot-like pattern
- Zoomed out to perceive the context at lower resolution

Switched to outer-placement view

- Moved the mouse cursor over the insets to assess their original location
- Zoomed and panned a bit
- Tried to combine two insets into a pile
- Reset the location of the insets
- Scaled up one inset to look at the detailed visual structure
- Zoomed into the origin of the scaled up inset
- Investigated when insets disappear
- Panned and zoomed further
- Zoomed out and compared to distant insets by dragged them next to each other
- Zoomed out further out to gain a broader overview

P5

Started with inner-placement

- Started panning
- Identified a specific pattern in an inset and zoomed into the inset's original location
- Zoomed out and panned to another location
- Found an unexpected pile of insets with "empty" patterns
- Zoomed in a bit and confirmed their hypothesis
- Zoomed out and found another inset with an expected pattern
- Zoomed into the inset's original location to study the context
- Zoomed out and compared the inset to other close-by insets

Switched to outer-placement view

- Scaled up a pile of insets to investigate the detailed visual structure of a square-like pattern
- Leafed through the pile of insets
- Zoomed into the original location of the pile of insets

P6	<ul style="list-style-type: none"> • Scaled up and leafed through other piles of insets in close proximity <hr/> <p><i>Started with outer-placement</i></p> <ul style="list-style-type: none"> • Gently panned and zoomed to gain an overview • Zoomed in to see more details • Scaled up two insets consecutively • Tried to zoom into the location of an inset via a double click • Zoomed into the inset's original location using the context menu • Zoomed out again after investigating the context of the annotated pattern • Panned to another location • Scaled up an inset with a square-like pattern <p><i>Switched to outer-placement view</i></p> <ul style="list-style-type: none"> • Zoomed in and out to understand the new placement behavior • Zoomed all the way out to find long-distant patterns, i.e., patterns far away from the diagonal of the matrix • Zoomed into a region without insets • Panned elsewhere along the diagonal • Scaled up an inset showing an unexpected pattern • Zoomed into the inset's original location but stopped half-way to investigate another inset • Panned to another region in the matrix • Closely investigated the detailed visual structure of three insets consecutively
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Table S2: Chronological summary of participant-specific actions and related tasks of the second, qualitative user study with domain experts.

1	2	3	4	5
1. What is your overall impression of the navigation technique? (1: not impressive; 5: very impressive)				
		x	xxx	xx
2. Do you think the concept of previewing small and aggregated regions as insets within the view is useful for finding interesting regions, i.e., does it shorten the time to decide if we region is worth exploring in detail? (1: disagree; 5: strongly agree)				
			xx	xxxx
3. How intuitive is the interface? (1: very unintuitive; 5: very intuitive)				
	x		xxxx	x
4. Are there any parts of the interface that were not intuitive?				
<ul style="list-style-type: none"> • With a very brief introduction (<5min) things were understandable • Re-sync button not obvious • Border gallery • Fading lines are confusing • Pile aggregation type not obvious • Disappearance of snippets is confusing 				
5. How useful is the tool in its current form to you? (1: not useful at all; 5: very useful)				
	x	xx	xx	x
6. Is this kind of exploration currently possible in any other form? (1: not at all; 5: very similar tools exist)				
xxx	x	xx		
7. If so, how does our tool compare against the other methods in terms of performance (A) and features (B)? (1: worse; 5: much better)				
A	x	x		x
B		x	x	x
8. Which (navigation) features (if any) are missing that would make this tool more useful? (Please sort by importance)				
<ul style="list-style-type: none"> • User-resizable snippets (2x) • Change color scale • Scale bar for snippet size • Delete snippets • Add new snippets manually (2x) • Toggle between placing techniques • Pin snippets • Adjust aggregate representation • Filter displayed snippets by some value 				
9. Imagine all missing features are implemented, how useful would do you think would this tool be to the research community? (1: not useful at all; 5: very useful)				
			xx	xxxx
10. Could you imagine this tool to be useful for other applications like matrices / heatmaps, geographic maps, large images / high content screens? (1: not at all; 5: very much)				
			x	xxxxx

Table S3: Closing questionnaire of the second user study. Each “x” stands for the answer of one of the six participants. The lists for question 4 and 8 have been paraphrased and combined for brevity. All questions were optional.