Gmail

Aditeya Pandey <aditeyapandey@gmail.com>

Decision on submission 1042 of VIS 2019

1 message

Petra Isenberg, Miriah Meyer, and Jo Wood <vis19b@precisionconference.com> 8 July 2019 at 17:07
Reply-To: infovis_papers@ieeevis.org
To: Aditeya Pandey <aditeyapandey@gmail.com>

Dear Aditeya Pandey,

Congratulations! We are delighted to inform you that your paper

1042 - CerebroVis: Designing an Abstract yet Spatially Contextualized Cerebral Arteries Network Visualization

was definitively accepted for presentation at IEEE VIS 2019 InfoVis Papers, to be held October 20-25 in Vancouver, Canada. The accepted papers will be published as a special issue of IEEE Transactions on Visualization and Computer Graphics (TVCG).

IMPORTANT
Please carefully read ALL of this email! The timeline for the remainder of the process is as follows:

August 1: Final camera-ready papers, supplemental materials, and final meta information due at: https://new.precisionconference.com/vgtc

August 15: 25-second fast forward and preview video due (separate submission, see details below)

Note that only papers that strictly conform to the formatting requirements will be accepted. Requirements for your final version are available online; please follow these instructions carefully: http://ieeevis.org/year/2019/info/presenter-information/final-information-paper-authors

Before you submit your final, camera-ready version, please carefully consider the following important information:

* In some cases during the second round review, the primary reviewers have made comments on the revised version of your paper. They may also have requested additional actions. Please address these comments and requests before submitting your final version. Any additional comments on your paper are included at the end of this email under the "Second round comments" header in the primary review.

* If you have annotated your revisions in the paper itself during the second round, please make sure that you remove all annotations in the final version. The final version should really be camera-ready, i.e., ready to be included in the proceedings AS IS.

* Any anonymization must be removed, and author names and affiliations must be the same as when originally submitted. Don't forget about any necessary acknowledgements if any should be included. Do consider thanking the reviewers if they have helped you to substantially improve the paper, but please remember you must stick to the 9+2 page limit in your final camera-ready submission.

* Please make sure the final submission data in PCS is *identical* to the final PDF (e.g. title, spelling of author names, affiliations, emails). You may need to correct the information in your PCS login in order to update the author information. Due to tight publication deadlines, it is critical that you update PCS *immediately* if there are any changes or discrepancies.

* Double-check that your paper fully conforms to the TVCG journal format. See the TVCG instructions and templates (http://junctionpublishing.org/vgtc/Track/vis-menu.html) for more information.

* Please note in particular the suggestions for ensuring that the images in your PDF document are stored at sufficiently high resolution instead of using the default lossy compression settings.

* You can include a video of your work on the conference USB stick. TVCG requires that supplemental material is also peer-reviewed, hence, this is only allowed if you have already submitted a video and if the reviewers have found it

acceptable. Videos are usually up to 5 minutes in length, and you may also include other supplemental material such as additional images or source code. The website above includes information on how to do so.

* Note that all authors of papers appearing at VIS are required to also prepare a 25-second fast forward video and a video preview of their work. This video material is due August 15 and will be submitted as a new Fast Forward video submission using the PCS submission website, i.e., not as part of the PCS submission for the actual paper. An author from each accepted paper is expected to present the video during one of the fast-forward sessions at the conference. Detailed instructions are available at: http://ieeevis.org/year/2019/info/presenter-information/fast-forward-and-video-previews.

* Each upload (in particular, your camera-ready copy) involves REPLACING the second round version in the conference system with your updates. If you don't want or need to make any changes to the version you already submitted, you do not have to upload a final version. However, you still need to fill in final information on the PCS form. Please make sure that your final submission is marked as complete in PCS.

* At least one author per accepted paper must register to present the work. Also, an author from each paper will be expected to present a short preview during a fast forward session.

* Authors of accepted papers are encouraged to post the final accepted version (i.e., the preprint version) to a reliable open-access repository. Criteria and instructions are available on the VIS website at http://ieeevis.org/year/2019/info/open-practices/open-practices. A repository that meets the criteria for long-term reliability and is in line with IEEE policy is http://arxiv.org. If you have any questions, want help, or would like to add another repository to the list, please contact the open practice chairs at open_practices@ieeevis.org. If you have posted your paper to any site that meets the criteria, please enter the URL on PCS. If you are unable to post a preprint, choose not to post, or choose to post to another repository, it would be helpful if you could please explain why, via the same text box, so that we can understand and potentially address any barriers that exist.

The official conference website, which will include final program and registration information as it becomes available, is http://www.ieeevis.org.

We are looking forward to an exciting and vibrant IEEE VIS 2019 InfoVis Papers with an outstanding set of papers. We thank you for your contribution to InfoVis Papers this year, and look forward to seeing you at the conference.

Petra Isenberg, Miriah Meyer, and Jo Wood
IEEE VIS 2019 InfoVis Papers Chairs

Primary Reviewer review
score 3.5/5

Paper type

Application / Design Study

Expertise

Knowledgeable

Overall Rating

3.5 - Between Possible Accept and Accept

Supplemental Materials

Acceptable

Justification

This is a design study for a visualization aiding medical professionals in diagnosing blood flow issues in the brain.

The strengths of this submission are clear goal and task abstraction and the thorough discussion and demonstration of the evolution of the main representation.

The weaknesses of this work are the definition, demonstration and integration of the abstraction with context paradigm and some of the details in the evaluation.

The weaknesses could either be omitted or fixed in the review cycle and the strengths seem beneficial to the community, which is why I lean towards accept.

The Review

The submitted paper is a design study which details the creation of a new visual system to help diagnose issues in brain arterial network. Both the data and task abstraction are clearly laid out and sourced. Fig. 4 is especially helpful for outlining the goals and tasks and justifying the need for network visualization. The inclusion of the iterations of the network visualization is demonstrative of how these problems are “not just another network visualization” but carefully considered design problems. The paper in general is well-written and clearly laid out.

The issues with the submission are the description and and integration of the abstraction with context paradigm and the evaluation.

There is also a missing important related work:

Though it is a visualization of the brain’s neural network, I would have expected a reference to “Blockwise Human Brain Network Visual Comparison Using NodeTrix Representation” by. Yang, She, Daianu, Tong, Liu,and Thompson.

The above work similarly recognizes the importance of maintaining the context of regions in the brain.

Abstraction with Context:

The concepts of abstraction with context and task to data ratio are discussed briefly at the end of the document. The concept is explained that if less data is needed for a task than all data available, that means data can be abstracted.

The example leaves questions. The example given is stenosis where the only the artery width is needed. My understanding was that connectivity with neighboring arteries is also needed. Including this analysis throughout the design or going over more design elements would help illustrate the concept as stenosis is not the only task.

It was also unclear where this paradigm fit with respect to other multi-view systems that facet the data but also include overviews. How is the facet not an abstraction (especially as it is removing data per the task to data ratio) and the overview not the context? A few references in map visualization are discussed in the related work, but given the broadness of this paradigm, a clear differentiation is needed.

Given the amount of change discussing this might take, it might be better to scale back the claim of a paradigm but include the recommendation in the discussion and relate it to existing multi-view strategies.

Evaluation:

There are two forms of evaluation: a validity claim through generating the layout for 61 datasets and a mixed methods user study.

For the validity claim, what is the rationale behind the three criteria chosen and how much difference in terms of topology is there among the datasets?

For the user study, how were the injected stenoses determined? Were these severe cases or was there are range of them? Were they based on real cases? The false positives reported seem to indicate that some of them can be subtle.

These questions can be answered in the review cycle.

Other Issues:

The wording (“insufficient”) of the take-away from the related work on network visualization is quite strong. Consider noting that this work builds on a body of work in network visualization that must be adapted for the arterial network context.

Fig. 6 would be more comprehendible if it had more labels showing what the sections are. The terms PComm, AComm, IC, BA and ACA are in the text but not labeled in the figure. Also, I was unable to find the “dashed line is used to represent the artery”. The only dashed lines I see seem to be about the bends.

The supplemental materials are appreciated. It would be nice if the video had some text in the beginning indicating there was no sound.

Summary Rating

Accept
 The paper should be accepted with some minor revisions.
Once these have been completed it will meet the quality standard.

The Summary Review

The reviewers agreed the paper is acceptable with revisions that can be accomplished in the review cycle. There was agreement that among the paper's strengths were its rigorous adherence to design study methodology and its writing. There was some concern among the reviewers regarding some of the claims made, the handling of related work, and some details in the evaluation, leading to the following recommendations for revision, in order of priority:

(1) The statistical method used in the mixed-method study requires a large number of subjects, but there are only three in the study. The authors should therefore either change their statistical model and/or scale back their statistical claims.

(2) The “Abstraction with Context” paradigm is not well-integrated with the design discussed and does not address known strategies for multiple view visualizations. The claim of a new paradigm should be similarly scaled back and/or removed from the abstract, introduction, and reflection.

(3) Address the missing references and issues in discussing related work brought up by R3 and R4.

(4) Elaborate on the design of the stimuli in the evaluation and the features of CerebroVis used (see R2, R4).

Second round comments (public)

I have reviewed the submitted files and verified that the required changes have been made and that the authors carefully considered and addressed the comments made by the reviewers.

Second round supplementary materials comments

(blank)

Secondary Reviewer review
score 3.5/5

Paper type

Algorithm / Technique

Expertise

Knowledgeable

Overall Rating

3.5 - Between Possible Accept and Accept

Supplemental Materials

Acceptable with minor revisions (specify revisions in The Review section)

Justification

see below

The Review

The paper presents a visualization technique for complex vascular brain networks. The technique addresses the problem of occlusion in a 3D representation of the network by proposing a structures flattening technique. The technique was developed through a very structured methodology with three domain scientists involved.

The problem is well motivated and the paper makes some contribution towards understanding how to make complicated 3D network structures more understandable. The methodology is very structured and the paper very well written with a nice and clear background and a careful related work section. The design is well motivated and based on a thorough task analysis. I enjoyed reading the paper and rigor put into this work. The final technique is evaluated through interviews demonstrations and feedback. It proved more accurate than existing 3D visualizations.

At the end, the only real question is about the overall contribution of the visualization itself. The system and interface are well polished and the paper shows usefulness. The steps required to generate the visualizations required some work. Yet, from the video, I feel a bit underwhelmed. The 'network' certainly is more a tree than a real 3D network. This takes a lot of thunder from the contribution since 2D tree-layouts from 3D trees with high structure are kind of trivial. The 'network' aspect coming from the CoW seems a minor constraint really and not posing any real challenge to the design. Brushing and linking and changing thickness of segments are well known techniques in visualization.

This leaves me a bit torn between wanting to support the structured methodology and specific domain application on the one side but on the other side supporting innovative contributions, especially given similar previous work on abstraction as mentioned in [6]. In the end, I think the paper is still a good contribution for VIS, showing how to work across disciplines and apply design and collaboration knowledge in a structured way.

Some minor issues:
- Is Fig 11 is CIs?
- 'asked identify' > 'asked to identify'
- can the paper explain how the vessels are retrieved from the raw image data?
- the video would benefit from a voice over.

External Reviewer 2 review
score 3.5/5

Paper type

Application / Design Study

Expertise

Knowledgeable

Overall Rating

3.5 - Between Possible Accept and Accept

Supplemental Materials

Acceptable

Justification

This paper described a design study of a 2D abstract visualisation for cerebral arteries. The paper is well-written. The research methodology the authors applied is well-established. The nature of close-collaboration with domain experts is also a strength of this paper. However, there are a few concerns about the design and the evaluation. Overall, I tended to accept this paper.

The Review

This paper described a visualisation project which visualisation experts collaborated with neuroradiologists to improve the process of identifying cerebral artery abnormalities. In my opinion, the main contributions are:
* the task abstraction obtained by expert interview and observation.
* the visualisation itself.
The paper was well-written and easy to follow. Enough background knowledge was provided to allow readers to understand the context. I pretty like the information written within two dividers.

There are a few concerns about the design:
* In Fig. 8, the left and right hemisphere have been exchanged from Sub-figure 1 to Sub-figure 2. What's the reason for this exchange?

* One important task needed to be supported was discussed in Section 5.1 (3. Find Missing Arteries). This task involves detecting unsymmetrical part of left and right. The design of CerebroVis can be improved for this task. For example, In Fig. 5, the left and right PCA were obviously in different length and shape. So as other branches. I believe it is possible to increase the symmetry of the current layout.

* Due to the lack of professional knowledge, this is more about my personal curiosity. The authors used the encoding of curve width: The "edges are scaled proportional to the average radius of the representative artery". This means the whole curve is in constant thickness. What about if the stenosis or aneurysm only happen in a small segment of this artery? In such a case, will the use of average to aggregate information mislead users? Does this happen in real-world cases? If so, the original 3D rendering should preserve such information, and CerebroVis can also encode the thickness in more details.

There are also a few concerns about the evaluation.
* Was the 3D visualisation used in the evaluation interactive? Allowing the user to pan-zoom and rotate a 3D visualisation is essential, as explored by many other researchers.

* The position of the manually added abnormal artery may affect the performance. If the added ones were at a certain depth and seriously occluded, without interaction, observing them will obviously be difficult.

* In the comparison, was only CerebroVis used, or the dashboard with a linked view was used? I am a bit confused about that, as the qualitative results included feedback about link view.

* The authors used "Generalized Estimating Equations Logistic Regression" method to conduct the statistical tests. However, according to [1], "the method requires a large number of subjects". In such a case. The authors may need to change their statistical model and the conclusions of their study were too strong.

[1] Wilson J.R., Lorenz K.A. (2015) Generalized Estimating Equations Logistic Regression. In: Modeling Binary Correlated Responses using SAS, SPSS and R. ICSA Book Series in Statistics, vol 9. Springer, Cham

A minor suggestion is to introduce the data earlier. Currently, the data was formally introduced in Section 8, and many earlier sections refer to it, this affects the flow of the paper a bit.

In general, I like this paper and think it should be accepted. I would strongly recommend the authors to address the concerns with additional information or modifications.

External Reviewer 3 review
score 4/5

Paper type

Application / Design Study

Expertise

Expert

Overall Rating

4 - Accept
 The paper should be accepted with some minor revisions.
Once these have been completed it will meet the quality standard.

Supplemental Materials

Acceptable with minor revisions (specify revisions in The Review section)

Justification

This paper provides an exemplary design study, and introduces an important problem in medicine in a very progressive and understandable manner for a lay audience. The contributions are tangible and reproducible. The methodology is sound, the validation by domain experts is very reasonable, and the mapping between domain needs and graph tasks is useful for visualization researchers willing to investigate the area of cerebral artery visualization. I consider that I learned something useful by reading this paper, and would recommend it to my data visualization students.

The Review

This paper presents a design study of a network visualization software to support the identification of abnormalities in the cerebral artery system. The paper provides a theoretic framing of the problem in terms of graph theory, a graph layout which is spatially consistent with brain anatomy, an open source implementation as well as a user evaluation.

Overall the paper is well structured and reads very well; the reader is provided with relevant information in a timely manner. The related work section is focused and appropriate, even though a few more references would make it more complete without losing focus (see below). The figures are appropriate and of good quality. The methodology employed in this design study is sound, the mapping between domain tasks and abstract graph tasks is useful. Design choices are always clearly

motivated, except for one instance. In general I would include this paper in a reading list for data visualization students, as it comes across as an exemplary design study paper. I would therefore recommend to accept it for publication.

Some weaknesses that need to be fixed prior to publication include:

- In the related work section

-- regarding "Constraint-Based Layout", I expect a more clear motivation/positioning of CerebroVis with respect to [50] and [59]. Statements like "Generic constraint-based algorithms [50] and implementations [59] exist but they were overkill for our needs." are content free and should be rephrased/developed by authors.
-- Under "Tree Layout and Comparison" the paper states "There are two common categories of tree visualizations: space filling techniques inspired by treemaps [54] and non-space filling techniques". I believe authors have missed an excellent reference for the categories of tree visualizations
https://doi.org/10.1109/TVCG.2010.79
and I would even argue that the authors make a false claim when they say that "While space-filling visualizations are a great way to optimize the usage of screen space to display attribute values, the topology of the tree is not the primary feature encoded." The claim may be true in the case of treemaps, but other space-filling techniques like icicle plots or the sunburst tree visualization do encode the topology too using adjacency.
-- The spatial consistency of tree layouts has been investigated several times regarding treemap layouts. Since the artery system is mostly a collection of trees + CoW which need to be laid out according to their spatial (anatomic) location, I believe the following references about spatially consistent treemap layouts are relevant to the related work section:
https://doi.org/10.1109/TVCG.2008.165
https://doi.org/10.1109/TVCG.2014.2346276
https://doi.org/10.1117/12.2079420

- In Section 7.2, under "Layout Technique", the paper states "CerebroVis uses an orthogonal arrangement as opposed to a radial arrangement." This is not the case in fact. The layout used in CerebroVis (Fig.5, rightmost thumbnail) is a layered upward planar drawing according to di Battista et al. [5], and this is what makes for a faster lookup of the hierarchy according to [9] and eases topology comparison (in section 7.2).

- Even though the paper has very few typos, here are a couple of issues that I spotted:
-- Caption of Fig 1.: "CerebroVis uses a abstract" => "an abstract"
-- Section 3.1, "A path an alternating sequence" => there is a missing word
-- "Nodes in the tree with a degree of at least two are called internal nodes", yes but since you set out to define all the basic graph concepts you should also define what node degree is...
-- Section 4.1 "Al-Awami et al. point out the advantaged of" => advantages
-- Section 6.1 "However the the tree"
-- Section 7.1 "a beizer curve is generated" => Bezier
-- Section 7.1 "The orthogonal arrangement of the network aides" => aids
-- Section 7.2 "with a simulated a thrombosis" too many a's
-- Section 7.2 "demonstrates how the same set arteries" => set of arteries
-- Section 9.3 "They were asked identify" => to identify
-- Section 10.1 "In our interative design process" => iterative
-- Section 10.1 "The process of abstraction with context, can be beneficial", remove the comma.
-- Section 10.2 "The novel unfamiliar representation of CerebroVis, and the easy length comparisons is provides, may require"
