REVIEWER'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Photo Stylization Using Painterly Rendering**
Author's name:	**Jan Lazarek**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Computer Graphics and Interaction
Thesis reviewer:	David Mould
Reviewer's department:	School of Computer Science

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**
Evaluation of thesis difficulty of assignment.	
Automating an artist's process is a far from trivial task.	

Satisfaction of assignment	**fulfilled with minor objections**
Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.	
Please insert your commentary.	

Method of conception	**correct**
Assess that student has chosen correct approach or solution methods.	
Probably correct; could have investigated further and justified choices. See freeform text at the end.	

Technical level	**A - excellent.**
Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.	
Implemented a range of algorithms in a fairly sophisticated way, including GPU acceleration.	

Formal and language level, scope of thesis	**A - excellent.**
Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.	
Excellent use of language, barring a few quirks.	

Selection of sources, citation correctness	**B - very good.**
Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.	
What is there is excellent. Considerable additional literature is available and could have been included at the candidate's discretion; see freeform commentary.	

Additional commentary and evaluation	
Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.	
The thesis describes an effort to automate portions of the workflow of digital artist Jakub Javora, which involved implementing and testing some algorithms from the NPR literature.	
By all accounts, the artist himself was quite pleased with the outcome of the thesis. That weighs heavily in favor of the merit of the work. On the technical side, the candidate investigated several concepts from the literature and carried out a respectable implementation of a few methods, notably the variant of the Kuwahara filter pioneered by Papari et al. and	

further developed by Kyprianidis and colleagues.

Apart from a few quirks, the thesis is quite well written and it is reasonably well organized. It could have benefited from more thorough treatment of some background material, both in giving more self-contained descriptions of the methods used and in delving more deeply into the rich literature on painterly rendering. Reading Hertzmann's 2005 survey on stroke-based rendering would have been a good starting point; the survey of image stylization techniques by Kyprianidis et al. (2013) provides a somewhat broader view.

The decision to base the work on the Kuwahara filter does not seem well justified. It indeed may have been the right choice; still, a clearer statement of the considerations and an articulation of the advantages of the Kuwahara filter over other painterly rendering techniques would have added a lot of value. Judging strictly from what is written in the document, it does not appear that other painterly methods were considered. (The document mentions the bilateral filter and mean shift segmentation as alternatives, but these are not painterly techniques.) The section breezily explains the choice as ``relatively clear'', which is not a justification.

This is not to say that the Kuwahara filter was a bad choice -- indeed, it may ultimately have been chosen even with a deeper investigation of alternatives (which may well have been undertaken, even if not described in the document). Still, for a future reader (perhaps a beginning Master's student)s wishing to learn something about painterly rendering, there would have beenconsiderable value in documenting a more thorough search.

The candidate has done a credible job with the implementation and the results look reasonable. Evaluation is always a challenging prospect for research in NPR, and I was happy to see that the artist has been consulted about the effectiveness of the method.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation. Please present apt questions which student should answer during defense.

I evaluate handed thesis with classification grade **A - excellent.**

I appreciated the breakdown of the artist's technique and the efforts to approximate the steps automatically. The candidate showed flexibility in pivoting towards an assistive tool rather than a rigid automation of a process. There was considerable effort expended on accelerating the implementation, which demonstrated good technical mastery.

Some questions:
What are the aspects of the Kuwahara filter that make it so appealing for this task?
Did you consider other painterly rendering techniques? What made them less suitable?
Are there kinds of images for which your technique works especially well? Especially poorly? Why?
You gave performance data, but there was little effort to interpret the data. What can we learn from these numbers?
Can you explain your path creation process further? It is not clear why you would be limited to the eight raster directions when adding another control point, given that you are constructing a vector object.
(Minor question) What is your intended meaning when you write "so-called"?

Date: **9.6.2022**   Signature: David Mould