FACULTY OF INFORMATICS

Fakulta informačních technologií VUT
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External reviewer report – PhD thesis

Candidate: **Ondřej Kanich**

Reviewer: **Vashek Matyáš**

Candidate's PhD thesis *"Research in Fingerprint Damage Simulations"* carries 148+3 pages, where I would strongly recommend many of the detailed results/descriptions to be moved to appendices.

The thesis structure is as outlined in the Contents (pp. 1-3) and with the main aim as stated "to describe the present technology in generating and implement methods that take the perfect fingerprint and transform it into a more realistic damaged phenomena in order to simulate a very specific damage done to a real fingerprint when it is acquired." My impression in fact is that the teams (that the author was a part of) not only reviewed the present technology and implemented the methods, but also created novel ones. Since only the main aim is stated and I did not find more rigorously stated research goal(s), I would like to ask the author to clarify this at the defence.

The author wrote a non-trivial part of general (introductory, etc.) text rather carelessly:

- A great example can be found right in the first paragraph, where the author suggests that the cheapest hardware sensor solution must be as small as

possible – while it is a common knowledge that these two aims are rather contradictory.

- I did not find the definition of term "the perfect synthetic fingerprint" (p. 5), and it was clear to me whether there is such one per person or there is one and only one. Alternatively, whether with the human growth/aging there may be more ones?
- Statement "automated recognition of people" in the start of part 2.1 and the given context again clearly allow for multiple interpretations.
- Statement "the biometric characteristic that is used to identify an individual cannot be lost or forgotten" is clearly exaggerated or – considering that this is a text of a PhD candidate – plain wrong.
- Childish ways of calling submissions "submitted publications", documents being written "publications in preparation" or listing an excursion to a university within research and development activities.

Typography of the thesis is average – while in many parts it goes well beyond average, trivial mistakes appear (Subsection vs. subsection right on two following lines of the text; abundant spaces between the percentage mark and the numerical value – Czech typographic convention – 45.3 %; closing with two punctuation marks "?."; etc.).

With respect to the strengths, the presented thesis present innovative and interesting results, is well focused and except for one aspect (see point 3 below) stands an international comparison.

With respect to the major shortcomings, my observations are:

1. The author sometimes fails to provided convincing (or even any) arguments for the research choices being made. E.g., "11 damages were chosen" in the start of part 5.4.2. I found no explanation why and how they were chosen.
2. In the Conclusion chapter, statement "Fingerprint image enhancement methods could be analysed and their limitations could be found through a generated database." appears, before the part on future work. This is a very unclear or even provocative statement for the conclusions before the future work section.
3. The Conclusion chapter operates with generic statements of the kind "was created", "was implemented", "are shown", "has been analysed", "have been described". Yet at its end this chapter leaves the reader with the obvious question "And what did the author himself exactly do?"

Questions for the defence:

1. What is the "another phalange" and what is/are the other ones you write about in the start of section 5.3?

2. In the Conclusion chapter, statement "Fingerprint image enhancement methods could be analysed and their limitations could be found through a generated database." appears, before the part on future work. What did you mean to state by this – you should have done – and did not do; some other team member should have done that; something else?

3. State rigorously research goal(s) of your thesis.

4. State clearly and beyond any doubt your contributions (qualitative, not just a quantitative share of contribution as stated at individual publications) to the results presented in this theses. Focus on two aspects:

   a. What did your contribute yourself and what is work of others.

   b. What novel scientific (not implementations, etc.) own contributions you value most.

In general, I have been exhausted by reading this thesis due to its length and structure. Here I would like to share a suitable note from Blaise Pascal that gets simplistically translated into English as "*I have made this longer than usual because I have not had time to make it shorter.*" The context-based interpretation of the French original puts it that he tried to explain *that his letter was longer than it needed to be, because he hadn't worked out the correct answer*.

Conclusions as requested from the letter of appointment:

1. The dissertation topic corresponds to the area of the dissertation and is up-to-date with the state of science today.

2. The work shows novel contributions. The original contributions of the work fall within the area of designing (and implementing) novel approaches to fingerprint damage simulation in an automated fashion.

3. The core publications the thesis is based upon were published in appropriate publication fora.

4. The list of scientific activities of the author implies that he is a worker with a scientific erudition.

5. The final requested conclusion, however, I cannot provide and I am not able to state whether the dissertation thesis of the applicant corresponds to the commonly accepted requirements for the award of an academic degree (I expect that PhD degree was meant here). On one hand, the document as such would correspond. On the other hand, as a PhD thesis *of the candidate* it fails to witness beyond my doubts what is the original contribution of the author.

Proposal: Given the condition that my questions 3 and 4 get answered beyond any doubt at the thesis defence, award the PhD degree.

Sincerely yours,

Vashek Matyáš