NEW APPROACH TO WOOD DEFECTS DETECTION

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Usual way to wood defects detection

- With most wood producers, wood defects are recognized by humans
- The same wood defects can be treated differently because of people subject opinion
- This way of recognizing largely depends on changing human factors such as human vision, experience, tiredness, etc.

New approach to wood defects detection

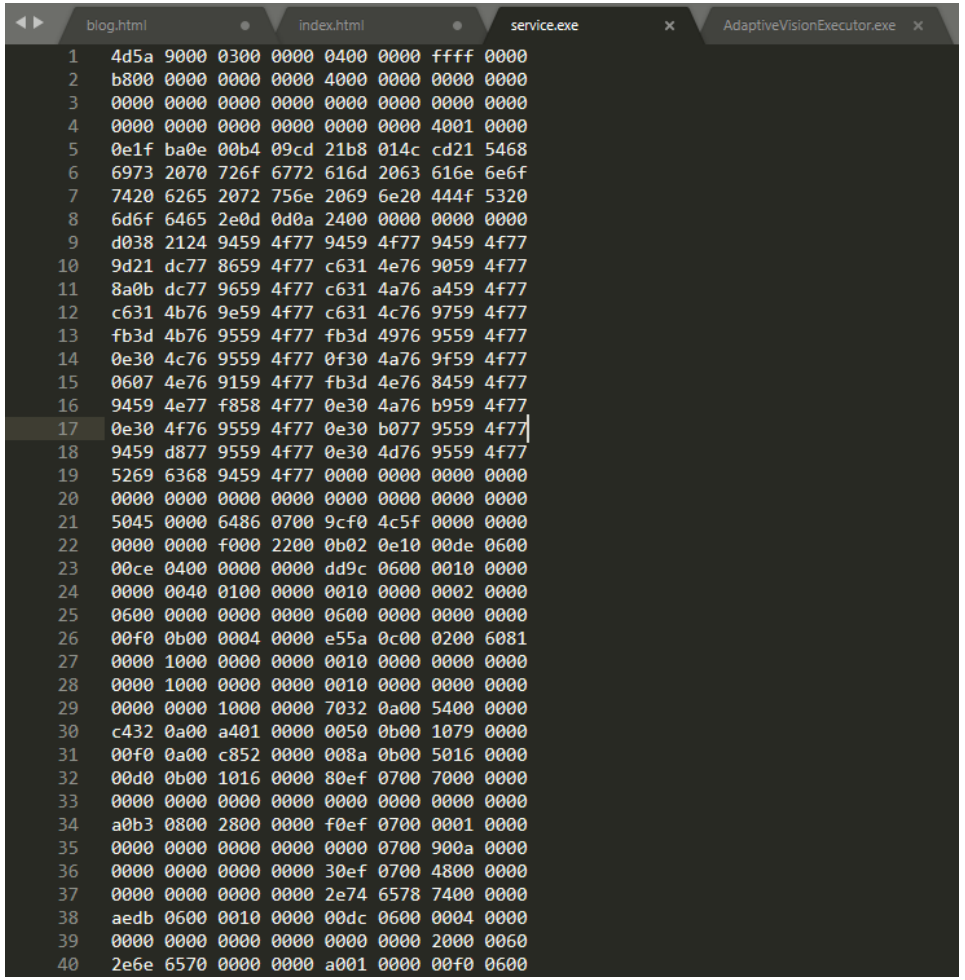
- Modern wood processing requests access to wood intending to maximize utilization of wood in qualitative and quantitative terms
- One of the main obstacles to this objective are wood defects which are unavoidable flaws in tree growth and development of wood matter (knots, cracks, discoloration, etc.)
- Nowadays, new technology is implemented in many factory processes

New approach to wood defects detection

- New technology eliminates the possibility of a subjective human view of defects
- The aim with software recognition is with digital input properly mark defects on the wood surface so that software can optimate production of wood elements based on the software solution
- Software categorize defects depending on shape, size and color

Recognition wood defects with software

- If we want to be completely sure in software defects detection, we need a large database of individual defects with which the software learns to categorize deformations on the wood surface
- With greater sensitivity and precision of the software program, we will get much higher efficiency with better quality wood material in the production process



Implementation of subject activity

- Determining significant texture and macroscopic characteristics of oak wood
- Creating a database of wood surface colors
- Creating database of possible textures on wood surface

Implementation of subject activity

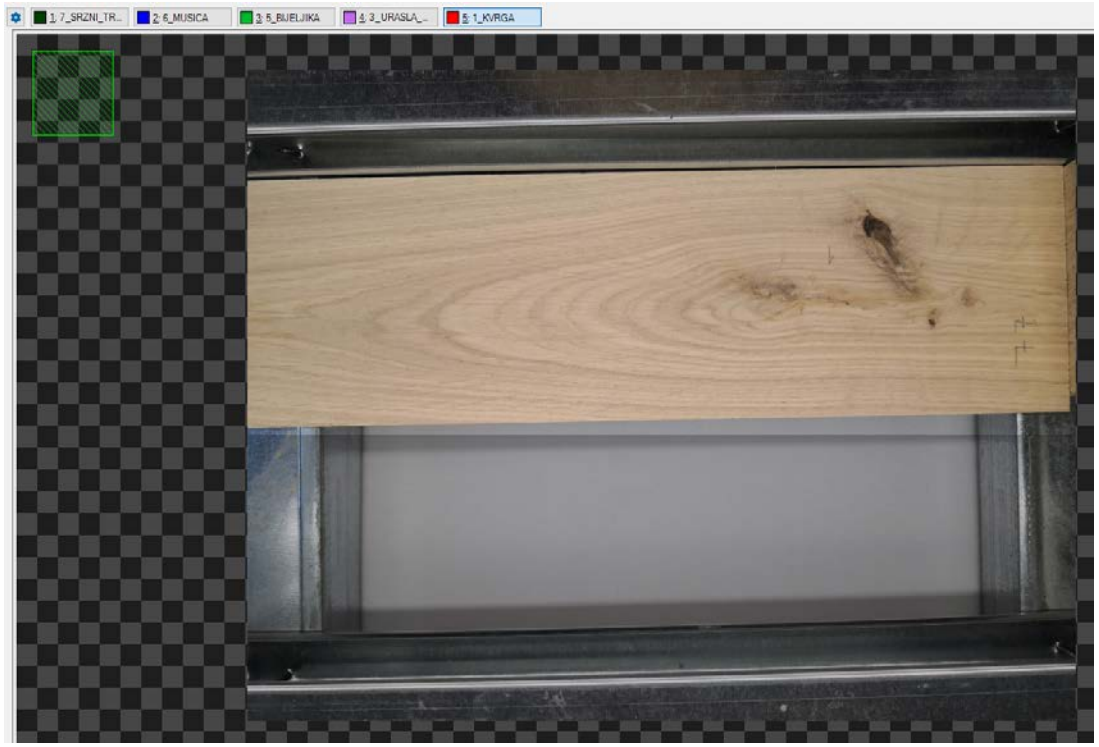
- Creating a database of texture specificity on wood surface
- Determination of general and specific macroscopic characteristics on wood surface important for optimization of saw cutting and production of designed elements

Aim of the research

- Determine wood defects with two industrial scanners as objective observation and detecting wood defects with the human eye as a subjective perception of certain wood defects having regard that human eyes also have their own limits
- Compare accuracy of the two software scanner solution for wood defects detection
- Compare that two software with a human perspective of the same wood defects

Materials and methods

- The research was conducted with slavonian oak (Quercus robur L.) wood, two software for wood defect detection, and several questionnaire respondents
- One software works on the principle of overlapping and merging several photos in one combined photo (one sample) while other software perform defects on a single photo of one sample
- Both software have 12 MP cameras



Materials and methods of questionnaire

- Questionnaire had 30 questions for 30 wood samples
- Every question has three possible answers (only one answer is correct) and percentage scale “How sure are you in your answer?”
- One of the main aim of this research was to study size of defects which human eye can see comparing to software and cameras
- Despite of current epidemic situation only 11 people were tested in mentioned questionnaire

1. What defect is visible to you in sample number 1?

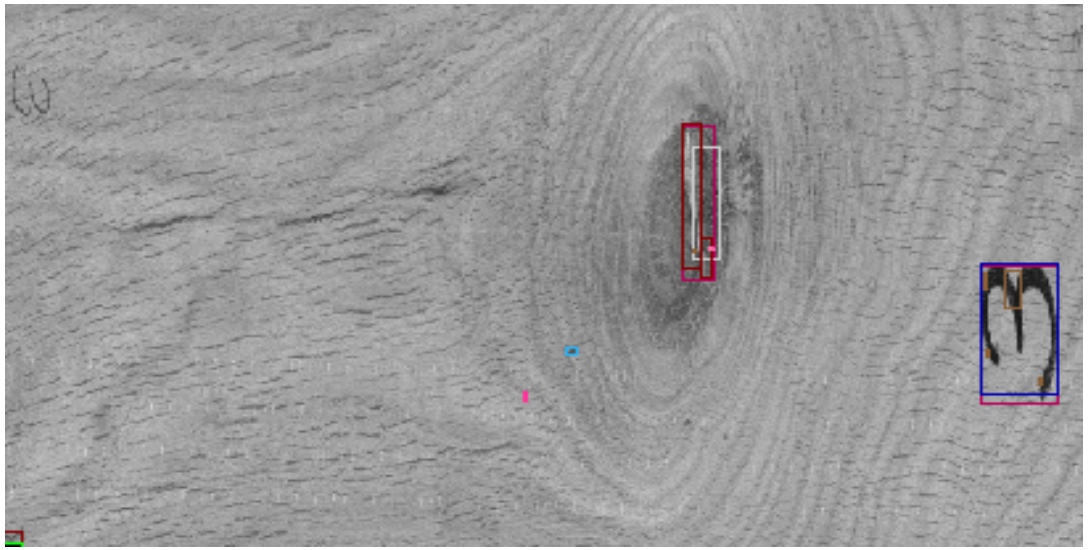
- ☐ Ambrosia wood
- ☐ Ingrown bark
- ☐ Cracks

How sure are you in your answer?

- ☐ 50 %
- ☐ 75 %
- ☐ 100 %

Software recognition results

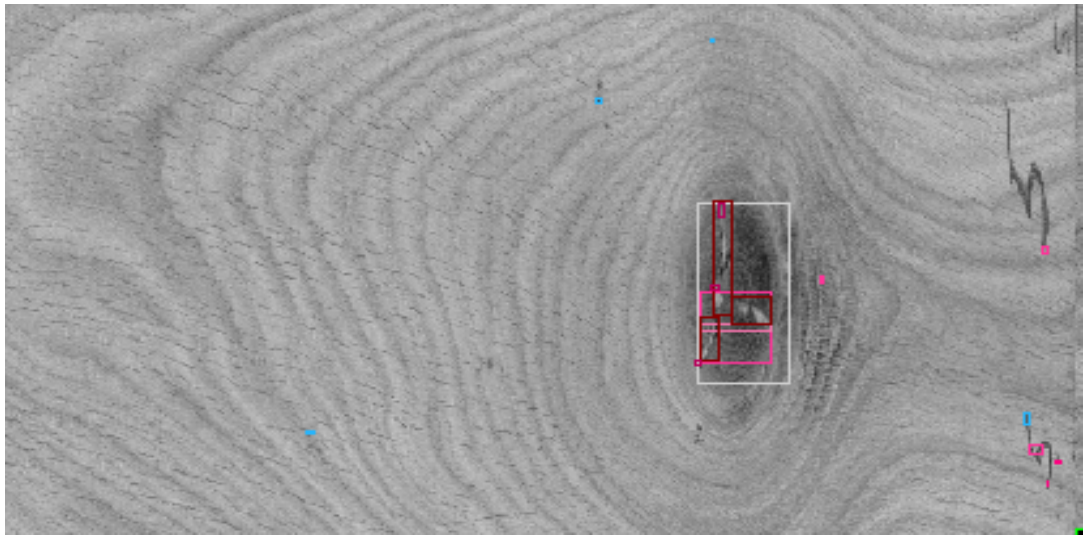
Software 1



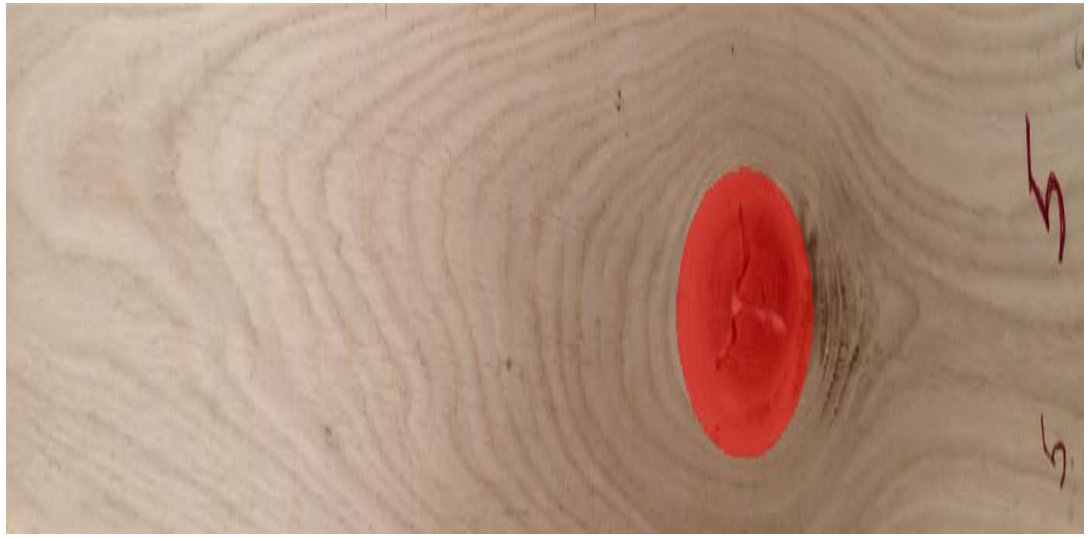
Software 2

Software recognition results

Software 1

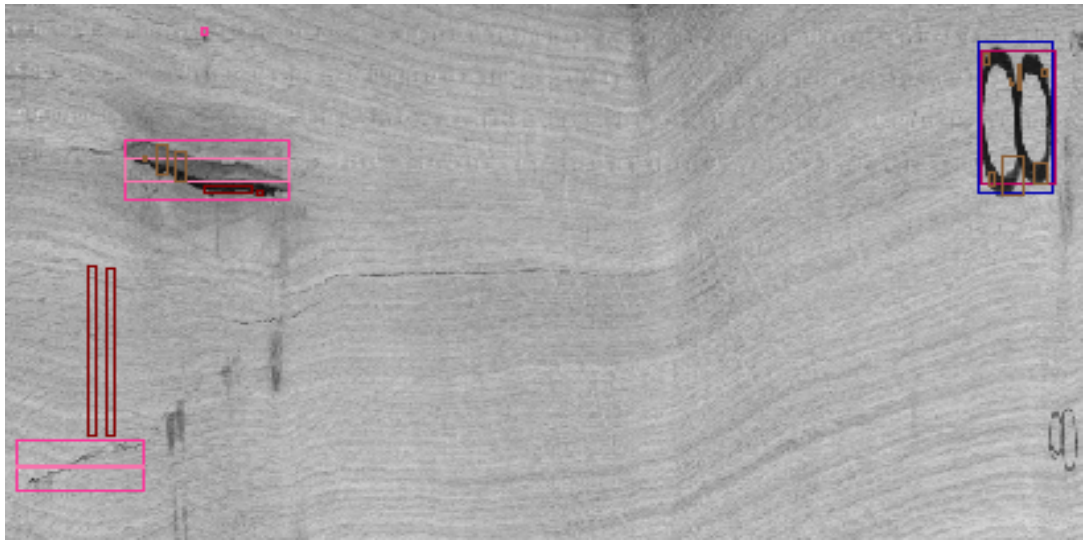


Software 2



Software recognition results

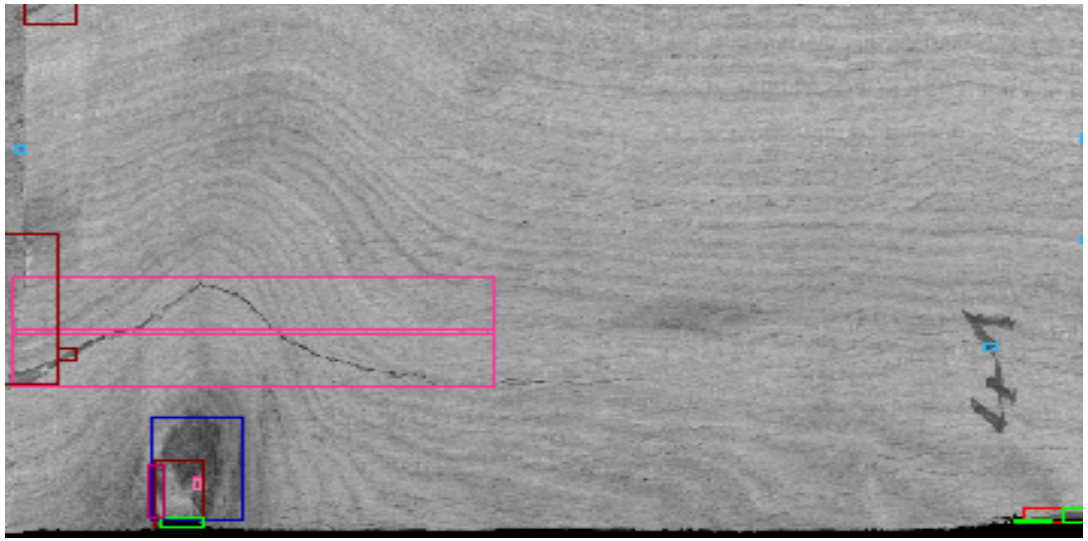
Software 1



Software 2

Software recognition results

Software 1



Software 2

Conclusion

- On the sample 3 software 1 detected one big knot and two small knots, while software 2 detected only one big knot
- Both of these two software didn’t recognize ingrown bark but in questionnaire 7 of 11 people recognized this defects

- On the sample 5 software 1 detected one big knot al several small knots, while software 2 detected only one big knot

Conclusion

- On the sample 8 software 1 detected one knot with crack and one separated crack, while software 2 detected one ingrown bark and two knots
- Neither of these two software didn’t recognize long and tight crack

- On the sample 41 software 1 detected one big crack and one big knot, while software 2 detected one big knot and one ingrown bark (wasn’t ingrown bark)
- In questionnaire 10 of 11 people recognized big crack

Conclusion

- Software 2 is still in development due to project activities and in the next stage of development his database will be filled with more information (defects) which will give him an increased level of recognition

Thank you for attention!!