CHANGE

CULTURAL HERITAGE ANALYSIS
FOR NEW GENERATIONS

Newsletter - December 2020

Photo: Colourbox.com

Welcome to the Newsletter of December

In this newsletter you can learn more about Sunita Saha's work at the technical university in Warsaw and her cooperation with the Academy of Fine Arts in the same city. Further down you can read about the classification of Munch paintings that three of our fellows are currently doing. In addition to this, you can get updated on the ongoing virtual training school as well as the CHANGE participation at the EuroMed conference in November this year.

Photo: Sunita Saha

Track and Visualise the CHANGEs on Cultural Heritage Surfaces

The conservation and restoration of cultural heritage objects are an occupation of protecting the material witnesses of human art from the past. It is very important to keep track of the occurrence of changes on its surface over time as documenting the changes is the first step to learn more about why they happen and hopefully how to limit the changes. Also, it is a good practice to document it from time to time and pass on the documented changes as well as the restoration process to future generations.

Involvement of virtual reality in the field of cultural heritage can improve the digital documentation of artworks. ESR4 Sunita Saha in CHANGE is currently working on the importance of change analysis and its respective colormap visualization and has recently published a paper on "Augmented Reality in Tracking the Surface Geometry Change of Cultural Heritage Objects". Link to this is provided in the button below.

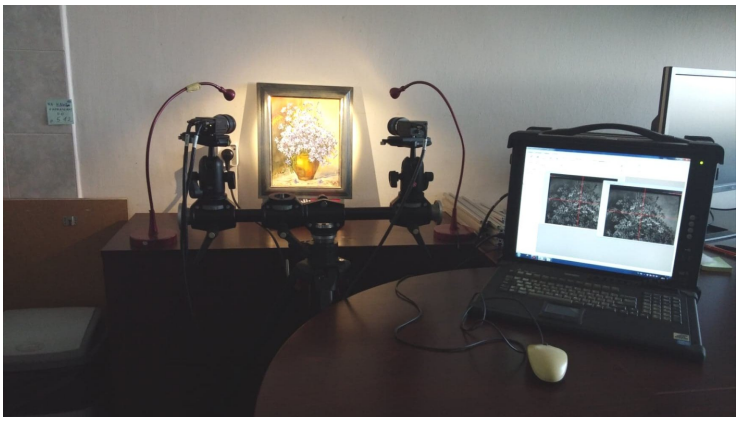


Photo: Monitoring the object's surface with Digital Image Correlation Setup (Sunita Saha)

In the era of interdisciplinary science, computational analysis and visualization of surface changes can play an important and efficient role to improve the 3D documentation of the restoration of artworks. One of the main challenges for this work is to get access and permission to work on cultural heritage objects without damaging them. We would like to acknowledge the collaboration with the Academy of Fine Arts Warsaw (AFAW) in Poland and the their conservation scientists for their supervision of Sunita's research and for providing access to their labs and cultural heritage objects. It is of high value to receive feedback on the research results from them.

Various research is going on in change analysis of cultural heritage surfaces in terms of global geometry (shape) change of the surface. Together with AFAW, Sunita has focused on keeping track of local geometry change on cultural heritage surfaces and classify the behavior of change over time. In one of their publications they explained their work motive very clearly and to know more detail about the approach, refer to the paper "Approach to Analysis the Surface Geometry Change in Cultural Heritage Objects" that is available from the link below.

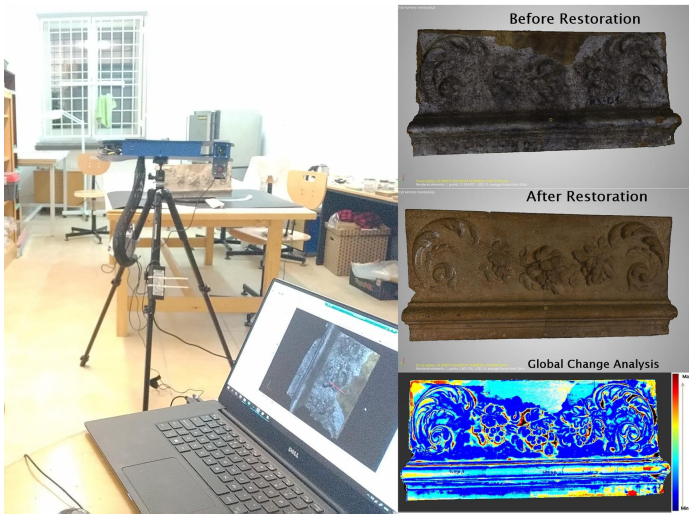


Photo: 3D scanning and change analysis before and after restoration (Chemical cleaning). (Sunita Saha)

Augmented Reality in Tracking the Surface Geometry Change of Cultural Heritage Objects

Approach to Analysis the Surface Geometry Change in Cultural Heritage Objects

Classifying Munch Paintings

Munch – the Norwegian painter is probably most famous for his painting called “The Scream” but as a talented artist who painted for 60 years, his heritage is immense. At the late part of 19th century and the first part of the 20th, Munch lived in a period where new ideas, new artists’ media and new ways of expression were put through to the forefront of the artistic world and the general public. You can see that this is affecting Munch’s artwork, as throughout his career his paintings change expression as he develops his own style. CHANGE fellows ESR 7 Yoko Arteaga, ESR 1 Agnese Babini and ESR 10 Jan Cutajar are currently trying to see if they can track the development of Munch’s own style through his career using imaging-based and AI-based methods.

Based on publications of art historians such as Gerd Woll who specialise in Munch’s artworks and using information available on the Munch website, the fellows roughly separated his many artworks into four categories, each category representing different periods of his career. The first category contains artwork from the early period of Munch’s career, when he followed the established, more traditional practices, whilst the second category shows the development of Munch’s own style and establishment as an artist with e.g. his artwork collection called "the Frieze of Life" that “The Scream” is part of. The third category contains his monumental public artworks that you can find in the Aula of the University of Oslo and at the Freia Chocolate Factory, and the last category is the artworks from the later period of his career. Jan Cutajar wants to emphasise that this is a loose categorisation based on Munch's lifetime as an artist and it must be kept in mind that he reworked the same motifs many times during his career and tracking those changes could be another way to look at his works. They have also been thinking of a third way to group paintings, by theme, as in the Munch Museum’s public database. The bottom line is that the CHANGE fellows’ work does not feature a definitive grouping of his paintings, but with using machine learning methods they will try to classify Munch paintings from a different period into one of the periods they have already defined. If their method works well, they can apply them to other kinds of categorisations and identify artists with machine learning methods.

Below you can see the schematic of the machine learning classification method. For the machine learning classification model, the images are split into training and test sets. For both sets PHOG (pyramid histogram of gradients) features are computed and these are used for the classification. Finally after performing k-fold cross validation, the model is tested on the test set.

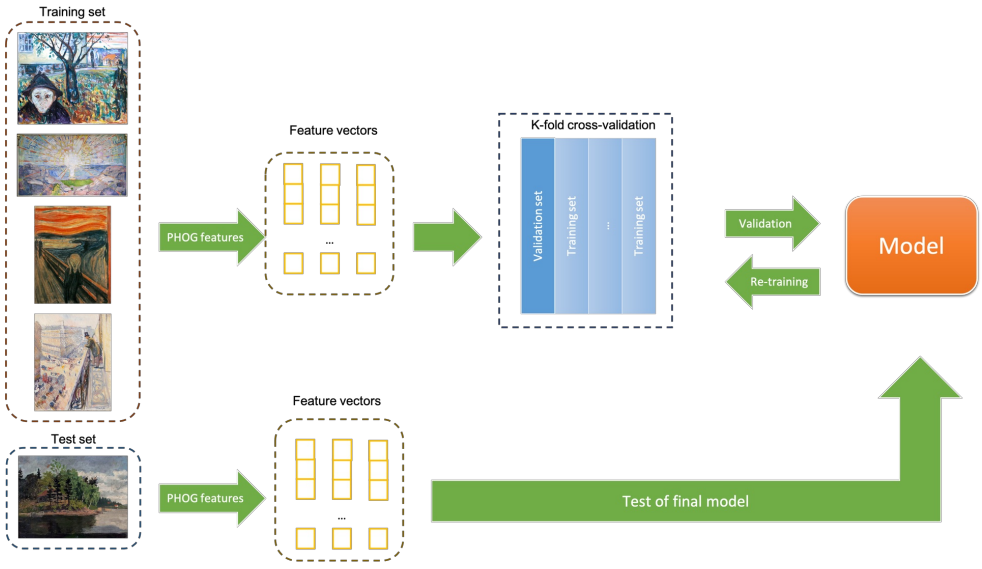


Photo: Schematic of the machine learning classification method. Paintings are (from the top): "Jealousy in the Garden", "the Sun", "Scream", "Rue Lafayette", all by Munch.

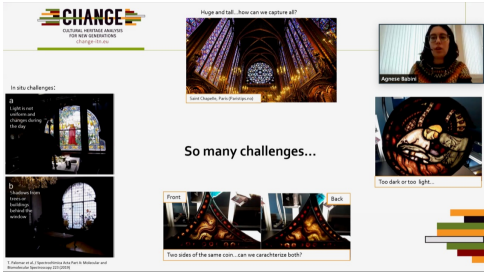
CHANGE at the 8th International EuroMed Conference on Digital Cultural Heritage

Photo: ESR 14 Thomas Rigauts

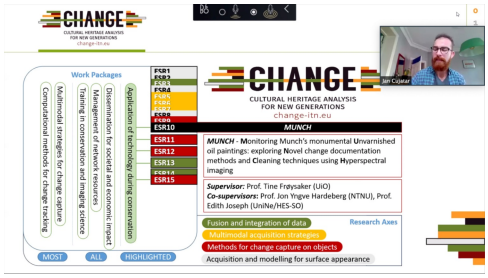
Organised every second year by the Digital Heritage Research Laboratory at the Cyprus University of Technology, the 8th International EuroMed Conference on Digital Cultural Heritage ended after an intense four-day programme conducted the 2. - 5. of November. This year, the event was held online due to the global pandemic, with the participation of 100 international speakers. Remarkably, attendance was 1063 unique participants from 77 different countries, significantly exceeding the expectations of the organisers. A range of workshops was organized and featured many well-established speakers from the field of Cultural Heritage and industry, who presented their research results in the areas of 3D documentation, digital innovation and data and knowledge management.

The CHANGE project was also closely involved in this year's edition of EuroMed. ESR 14 Thomas Rigauts, who is based in Cyprus, was an active member of the organising committee and he was responsible for co-organising the Workshop on how digital technologies can contribute to preservation and restoration of Europe's most important and endangered cultural heritage. In addition, Thomas also created content for the conference's social media channels for the whole duration of the event. The conference ended on a high note, with presentations of two CHANGE Fellows on Thursday 5 November. ESR 1 Agnese Babini presented her work on Imaging techniques for change documentation and monitoring of stained-glass windows and ESR 10 Jan Cujatar introduced the audience to MUNCH. Monitoring Munch's monumental Unvarnished oil paintings: exploring Novel change documentation methods and Cleaning techniques via Hyperspectral imaging.

The conference was broadcasted live on Zoom and Facebook, and promoted through the Social media accounts of the Digital Heritage Research Lab.



Print screen from ESR 1 Agnese's presentation



Print screen from ESR 10 Jan's presentation

More information about EuroMed conference

CHANGE Virtual Training School

As for many others, the virtual seminars have become a big part of the working day of our project members. When the pandemic stopped us from meeting in Paris for the CHANGE School France this spring, we decided to go on with parts of the training programme that could actually fit well, or at least OK, in a virtual context. The CHANGE Virtual Training School emerged this autumn, and all the 15 Early Stage Researchers are joining short virtual sessions covering different topics once a week from November to January.

Photo: Under the Wave Off Kanagawa, The Metropolitan Museum of Art.

Japanese Woodblock Prints

One of the perks of offering the training virtually is that it is easier to invite people from all over the world to hold a presentation. A virtual event made it easier for Marc Vermeulen, a research associate at Northwestern University in the US, to join the event and give us a presentation about his colour analysis of Japanese woodblock prints. It was interesting to learn how he could infer the chronology of the print production.

As the Japanese woodblock prints were most likely produced in an industrial way, like a manual assembly line, the workers were probably using similar paper as well as similar pigments and colour mixtures in each batch. Based on measurements of the pigments and colourants, and especially the mixture used in the outlines, he could group the pictures into clusters using statistical methods. Then, by comparing the line quality of the similar prints found in different clusters, he could conclude in what order the clusters were printed – creating a chronology of the production.

Infrared imaging

In a painting, you may find information that is not visible to the human eye. Clotilde Boust, head of the Imaging group at the Research Department of C2RMF, explained how infrared imaging can be used to go through the layers of the painting and detect the carbon and the pigments of the painting. If it is made carbon drawing or writing in the support of the painting, the infrared will detect them, revealing the text normally hidden under the paint. In this way, we can see if the painter has made any changes as he or she went along with the painting and we can easier understand the techniques the painter made us of.

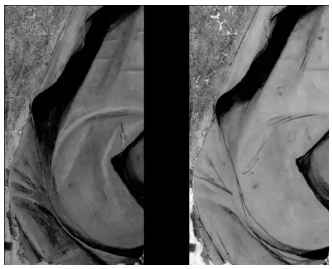


Photo: Painting of a sleeve, where the left is showing the underlines (C2RMF).

By using different light and imaging techniques, you can detect and document information about a painting that is not visible on a picture taken with a regular camera. For a relief painting with a lot of structure in the surface, a regular photo of this will in many cases show a flat structure. Using a raking light, this surface will get more visible also in the picture, making it possible to compare the photos from different time periods to detect changes that occur in the surface over time.

Photo: The same painting with different lighting when photographed (Van Gogh: Mademoselle Gachet, Musee d'Orsay)

3D scans

When working with Cultural Heritage (CH) Objects, you are often working with very fragile items. The risk of damage the objects are limiting what sorts of analysis you can conduct. Charlotte Hochart and Alexis Komenda from C2RMF gave us an insight to the use of 3D scans for analysis of CH objects, allowing assessment of the object in all angels without touching the fragile object. They also showed the interesting work on documentation of the fire damages in the Notre Dame cathedral in Paris where they used drones to scan inside the cathedral. Also, cable cameras were running on a line to take pictures where the drone couldn't fly due to damages causued by the fire.

Marc Vermeulen's publication

Seasonal Greetings!

2020 is coming to an end. Despite the pandemic, a lot of interesting research have been conducted by the CHANGE fellows. In the management team of CHANGE, we are highly impressed by the work they have done and for keeping up the spirit through a very difficult time. As the new year approaches, we hope 2021 can be the token of better times.

Thank you for following our Newsletter in 2020. We wish you all the best for the Holidays and a Happy New Year!

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