

DigiHealth Institute at the Neu-Ulm University of Applied Sciences

List of current projects

Neural Networks for Neuropathology (N4N)

The project "Neural Networks for Neuropathology" (N4N) is carried out by HNU's [DigiHealth Institute](#) in collaboration with the Institute of Neuropathology of the Technical University of Munich (TUM).

The goal of the project is to investigate pathological sections of glioblastomas – the most common malignant brain tumor with an infaust prognosis¹ – using modern machine learning methods. Tissue samples taken intraoperatively must be evaluated as quickly as possible in order to provide the surgeon with feedback on the degree of resection. The operation can be individually adapted and supported by the new method. A neural network will automatically pre-evaluate optical microscopic data, highlight tumor-affected tissue areas, and direct the pathologist's attention to suspicious areas within the pathological sections. This procedure will enable a more precise and faster diagnosis. In a second step, the image data and other metadata can be used to predict patient survival.

The Institute of Neuropathology at TUM provides the image data for this purpose. Individual image scenes of the pathological slices are about 6.5 gigabytes in size and have a resolution of 70,000 by 40,000 pixels. In order to make the image data effectively usable, the images are first labelled, after which the HNU trains a neural network for the automated detection of malignant tumor cells. The results are then available to the pathologist for evaluation.

CareRegio

The presentation introduced the innovative project [CARE REGIO](#) in Swabia (Bavaria) to the international audience. CARE REGIO is being carried out in cooperation with the Universities of Kempten, Augsburg and Neu-Ulm, the University of Augsburg, and the University Hospital Augsburg. The project aims to establish new digitization concepts and the continuous digitization of patient data in nursing, which are expected to optimize the time and effort required by administrative and nursing staff. Moreover, CARE REGIO seeks to facilitate the transfer of nursing patients between different institutions and make processes for nursing staff more efficient. The CARE REGIO project is funded by the Bavarian State Ministry of Health and Care (Bayerisches Staatsministerium für Gesundheit und Pflege). The conference presentation was created and presented by Michael Örtl, research associate at HNU's [DigiHealth Institute](#).

Digemed

In the project "Digital Business Processes in Medicine" (German: [Digitale Geschäftsprozesse der Medizin](#), Digemed), the potential of digital biopsy using a high-performance Zeiss CONVIVO endomicroscope is being investigated and assessed using the example of surgical resection of brain tumours. The project, which is coordinated by Prof. Dr. med. Walter Swoboda at HNU's [DigiHealth Institute](#), also involves the Department of Neuropathology of the Clinical Centre of the Technical University of Munich (TUM), the company Carl Zeiss Meditec AG, and the company ClarCert GmbH. The project is funded by the Bavarian State Ministry of Sciences and Arts for three years (January 2019 to December 2021).

mHealth Evaluation

This current project aims to develop a novel and holistic evaluation framework for professional mobile health applications. The purpose of the framework is to support healthcare providers when choosing an application and the support the decision-making when determining which applications a healthcare system should reimburse for.

Telemedicine for child and adolescent psychology

DigiHealth Institute is supporting Tübingen University Hospital with the evaluation of a telemedical solution for psychological counseling for adolescents.

COVID-19 social distancing with UCFSPA and Johns Hopkins

The team at the DigiHealth Institute is conducting an online survey with partners in the US and Brazil about the coping with the social distancing during the current COVID-19 pandemic in the US, Brazil and Germany.

Ethical Review Board for the Universities of Applied Sciences in Bavaria

DigiHealth Institute founded the Ethical Review Board for all Universities of Applied Sciences in Bavaria. The Board is being led by Prof. Swoboda and the administration of the board is housed at HNU.

n-of-1 study with an mHealth app for Restless Leg Syndrome patients

To conduct a study with the n-of-1 study design, the team had an app developed for a study regarding restless leg syndrome. Patients will receive a number of interventions and will be asked to rate them afterwards for data collection.

Remote sensing and on-site characterization of wetlands as potential habitats for malaria vectors –A pilot study in southern Germany

Wetlands, particularly in developing countries, are common hotspots of insect-borne diseases that are a constant threat to public health, such as malaria. To help identify and characterize potential breeding grounds for mosquitoes, we utilize freely available satellite image data and software in combination with a mosquito trap system. Multispectral time-series analysis of Sentinel-2 and Landsat 5–8 satellite images of Lake Schmiechen (Swabian Alb, southern Germany), used here as a pilot and analog site for other lake and wetland areas potentially populated by malaria vector mosquitoes, reveals non-seasonal periods of flooding and drying and concomitant changes in the distribution of open shallow water. Water distribution maps are derived from spectral indices commonly used for wetland mapping (e.g., the NDWI₂) and should be ground-truthed. In combination with the identification and counting of mosquitoes and the integration of other environmental parameters on-site, this approach provides a powerful tool to remotely monitor relatively small bodies and narrow networks of open shallow water that may provide habitats for mosquitoes. Combined remote sensing and on-site monitoring of potential malaria vector habitats can be implemented at low cost and with little effort in regions worldwide where the disease is established or emerging, and can be used to create or refine risk maps on small to large scales. The present approach can, moreover, complement public health programs and humanitarian efforts to fight insect-borne diseases.

DiSARM (Disease surveillance and risk monitoring platform)

<https://www.disarm.io/> The Disease Surveillance and Risk Monitoring (DiSARM) project is building tools to help disease control programs use data to target interventions spatially, guide field teams more precisely, and evaluate coverage more robustly. A key aspect of the DiSARM project is the development of algorithms that can help distill data into actionable intelligence. These algorithms can be integrated into applications such as the [DiSARM application](#) or can be accessed through an [application programming interface \(API\)](#)

The team at DigiHealth is supporting the evaluation and previous work on this by team members included the interoperability with existing surveillance IT systems.

Intercase (in preparation)

The project INTERCASE addresses the prototypical development of an aggregated core data set concept for rehabilitation, supplemented by updated data from rehabilitation and mobile devices. Its technical transfer to ePA-291a (German electronic patient record) would be addressed. Standardized data sets would be available on the patient pathway intersectorally.

For the conceptual design conceptual design of core data set the methodology developed in the Medical Informatics Initiative is applied. It deploys the technical methodology of medical information objects (MIOs) developed by the National Association of Statutory Health Insurance Physicians (KBV) which is based on FHIR (Fast Healthcare Interoperability Resources). Using this standard, the hospital information systems (HIS)-Interface can be applied to integrate data into the electronic patient file according to §291a SGB V which is mandatory for all hospitals (cf. gematik GmbH, 2018).

The rehab core data set is developed in aggregations. First, the core data set is developed. Second, it is supplemented by the medical specific rehab data set, which will be updated during rehabilitation treatment. This data will be continued and updated by the hospital received. Third, the core data set is supplemented by eSource data from mobile devices during the rehabilitation process. The devices are initially identified and classified for the use in a medical and rehabilitative context. The mobile health data is, where possible and sensible, technically, and semantically prepared to be integrated into core data set.

Finally, the rehab core data set plus the standardized eSource data set will be available after rehabilitation to be integrated into the patients ePA-291a and transmitted to the Data Integration Centers (DIC). The ePA-291a thus acts as a patient-controlled data hub.