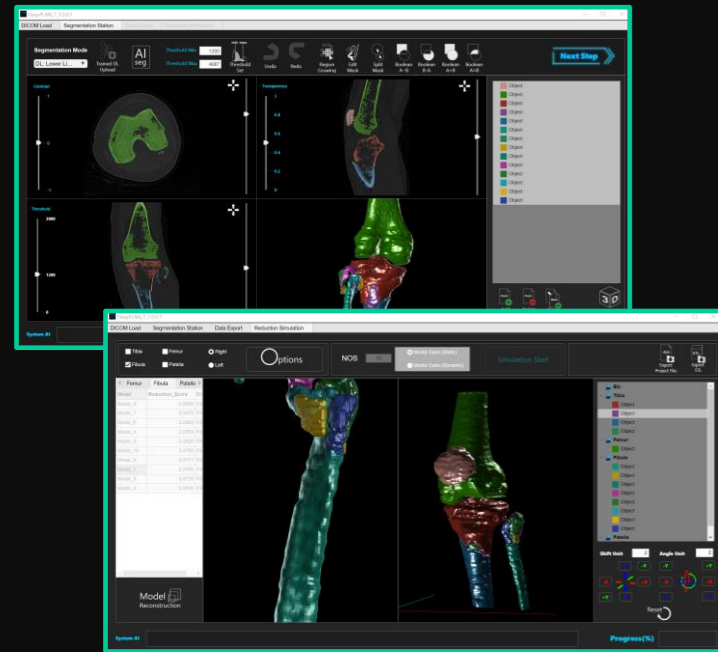


DeepPLAN T

AI-based Pre-operative Surgical Simulator



DeepPLAN T is a pre-operative surgical simulator for **orthopaedic trauma**. It supports simulating the trauma surgery including the identification of fractured fragments, reduction of all fragments, etc. Deep learning in DeepPLAN T assists in simulating the surgery through full automation or user interaction.

Automatic Segmentations

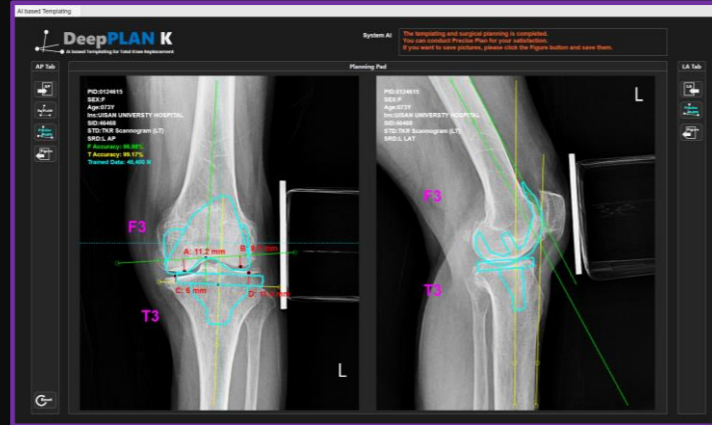
Deep Learning for segmentation can automatically conduct the semantic segmentation using the mask for the fractured fragments from each CT image one slide by one slide. Lastly, the segmented regions are reconstructed as the 3D image for the intuition.

Automatic Reduction

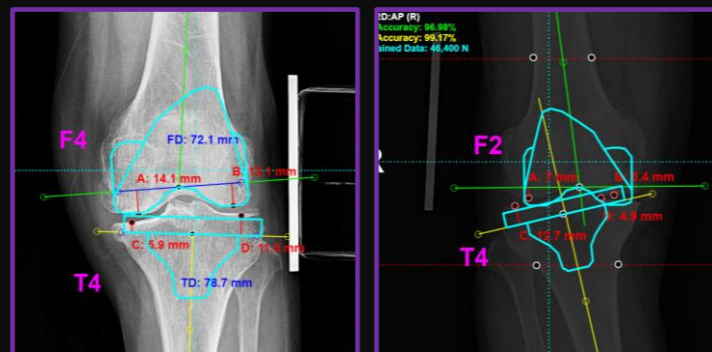
Monte Carlo transformation can re-arrange the segmented fractured fragments by randomly changing the position and angulation according to the probability model. By the several simulations, the decision tree finds the best-reduced model among the several results.

DeepPLAN K

AI-based Digital Templating System for TKA



DeepPLAN K is a deep learning-based digital templating system for **total knee arthroplasty (TKA)**. The surgeon can easily make accurate pre-operative surgical planning for TKA with the assistance of deep learning. It will be a good opportunity to save time and to achieve successful operation.

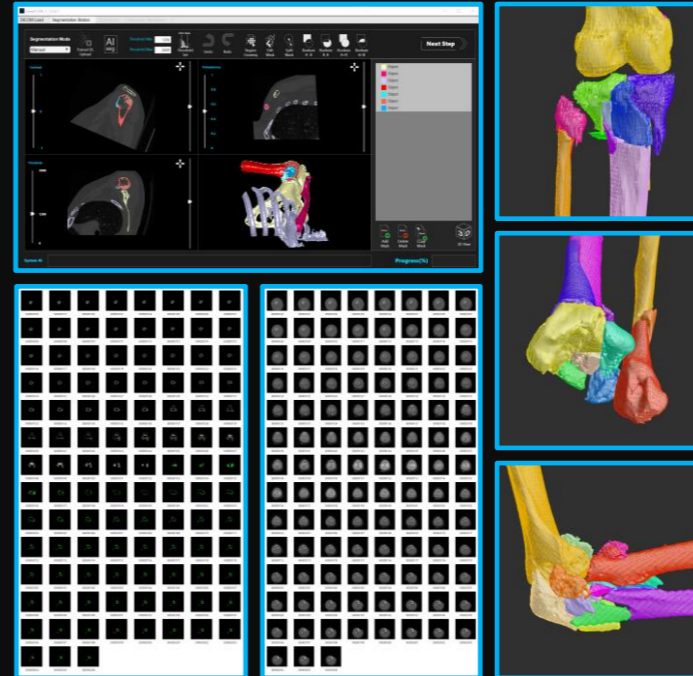


Automatic Digital Templating

Convolutional neural networks find the best model of implants with the optimized component sizes. The digital templating is automatically performed by the system. The surgeon can confirm the pre-operative surgical plan within 15 sec after uploading the X-ray image.

DeepPLAN A

Interactive Medical Image Control Software



DeepPLAN A is an **interactive medical image control software** that specializes in 3D printing and data generation of deep learning for semantic segmentation. Researchers in the medical field can easily and efficiently handle this tool to progress high-quality studies.

Create a Research Topic

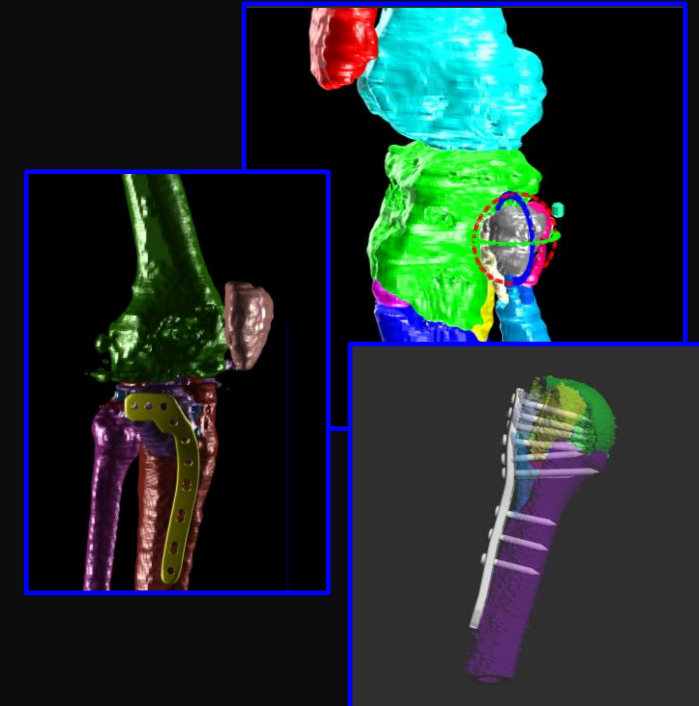
DeepPLAN A provides many convenient functions to control medical images such as segmentation, 3D reconstruction, data annotation, Stereolithography (STL) export, etc. Researchers can use the results to study medical image processes, 3D printing, and deep learning.

Data Export: STL, Mask

DeepPLAN can export the results of projects as 3D STL or 2D mask images. The STL file can be used for designing patient-specific implants or studying anatomical analysis. 2D mask images are employed to train the deep learning model for semantic segmentation.

DeepPLAN F

AI-based Virtual Surgical Planning System



DeepPLAN F is a **virtual surgical planning (VSP) software for orthopaedic trauma**. You can create a new design of patient-specific implants for 3D printing. Moreover, you can also establish surgical planning using the info on conventional implants by the manufacturer which has a business agreement.

Automatic Surgical Planning

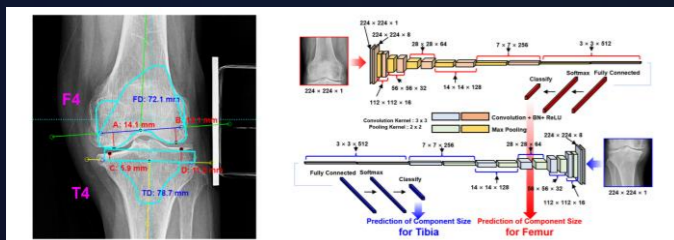
Upon obtaining simulation outcomes with DeepPLAN T, DeepPLAN F can produce virtual surgical planning for orthopaedic trauma based on the DeepPLAN T results. VSP entails suggesting the optimal implant model from numerous conventional options and arranging its placement to ensure a successful operation.

Design Patient-specific Implants

Surgeons unfamiliar with 3D modeling tools can effortlessly create fresh designs for patient-specific implants through the utilization of DeepPLAN F. Furthermore, DeepPLAN F facilitates surgeons in independently modifying their own designs.

Technology Overview

Deep Learning-based Decision, Classification



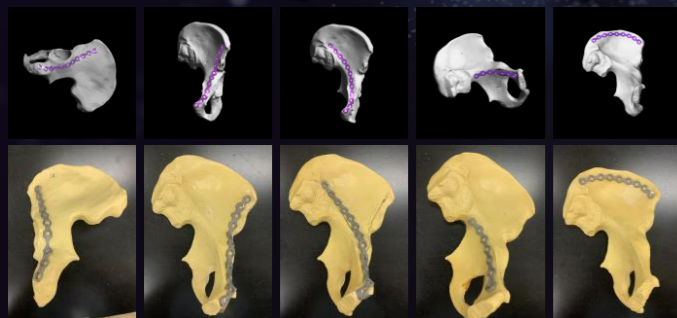
Convolutional Neural Network which we proposed provides useful information and assistance to make a decision for the diagnosis, planning, and surgical treatment.

Medical Image Processing



3D Imaging technology using GPU acceleration quickly provides high-quality image reconstruction with strong intuition.

3D Modeling and 3D Printing



The technology of 3D CAD/CAM realizes the patient-specific instruments as well as the several personalized implants.

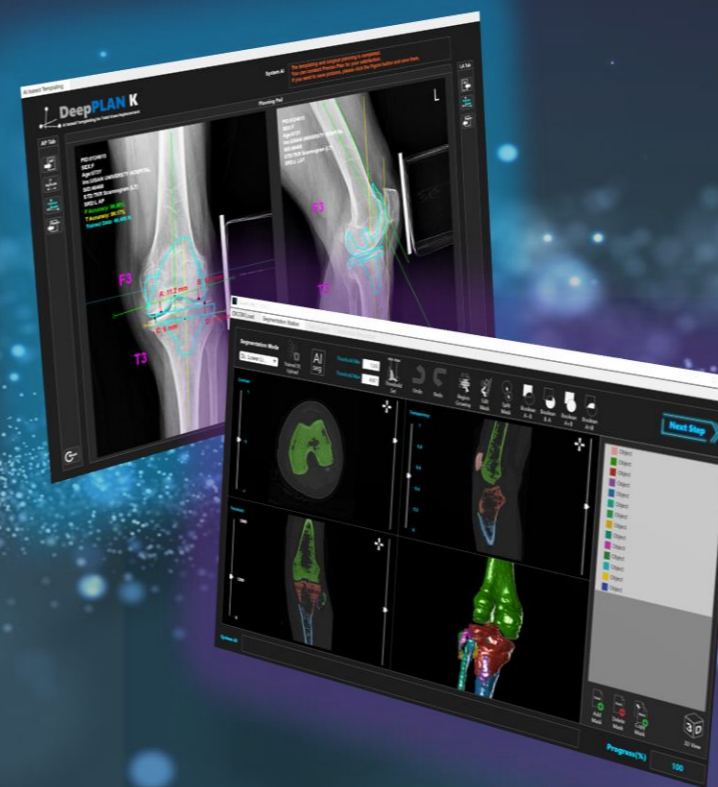
Woo-Lam Jo, et al. *Scientific Reports* 13.1 (2023): 10542.



+82-2-525-1109
send@kavilab.ai



AI-based Pre-operative Orthopaedic Surgical Planning



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Technology Overview

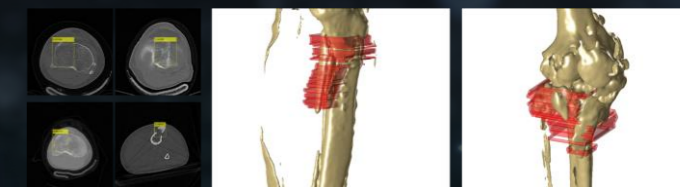
Deep Learning-based Segmentation



DL-based deep learning model for automatically segmenting fractured fragments from CT images.

Hyeonjoo Kim, et al. *Scientific Reports* 13.1 (2023): 20431.

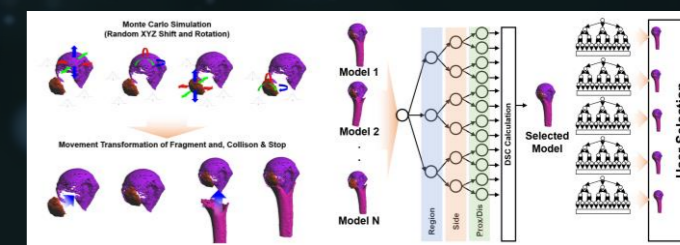
Deep Learning-based Object Detection



DL-based object detection model finds the fractured region and provides a guide for the location of the orthopaedic implant.

Young-Dae Jeon, et al. *Diagnostics* 14.1 (2023): 11.

Monte Carlo Transformation



The reduction of the fractured fragment using Monte Carlo simulation which can randomly reset to the physical states of an object.