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Studies on management of the infrastructure

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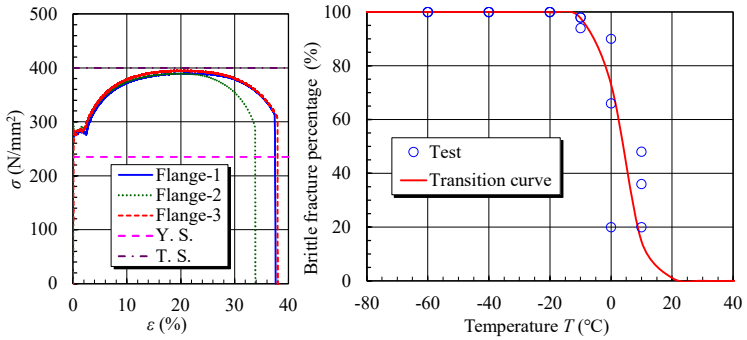
Keywords	aged steel, built-up member, repair, small size suspension bridge, structural safety, artificial intelligence, robotics process automation

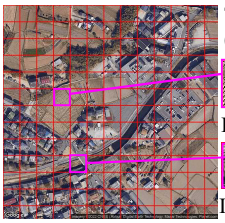
Technical Support Skills
Investigation on material properties of steel used in aged structures
Ultimate strength evaluation and repair method of built-up members with damage caused by corrosion
Investigation on ground object by using aerial photograph and geospatial information
An evaluation of serviceability and structural safety of small size suspension bridge with cable system deterioration

Research Contents

(1) Investigation on material properties of aged steel removed from existing bridge
(2) A study on load carrying capacity of built-up column with disappeared lacing bar
(3) A study on load carrying capacity and deformation properties of small size suspension bridge with deteriorated cable system
(4) Bridge detection from aerial photograph by using artificial intelligence in combination with geospatial information

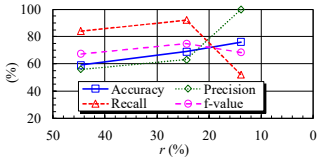


Material coupon test and Charpy impact test results of removed member from Morimura bridge (completed in 1906)



Training / verification data (100 x 100 pixel)
1000 images for training
50 images for verification
Image with bridge
161 images for training
50 images for verification
Image without bridge

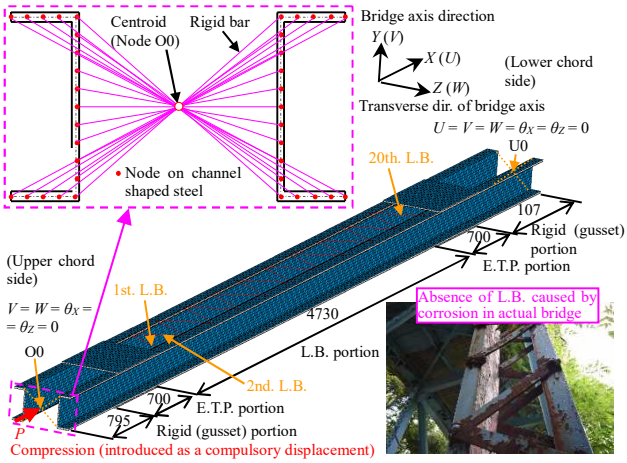
Aerial photograph (Google maps, Scale 18, 1280 x 1280pixel) (Generation of image patch employed in training and verification by dividing 13 x 13)

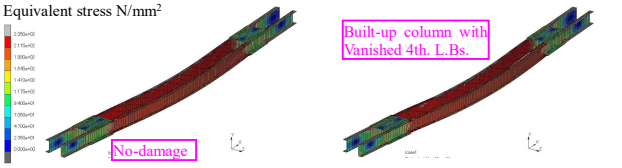


Relationship between constitution of training data and classification performance (r = total number of images with bridge / total number of images)

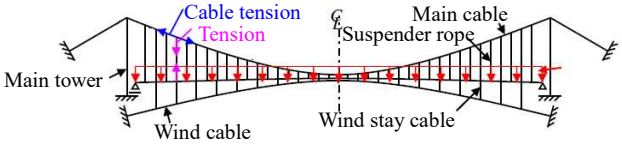
Creation of AI model by using AI software

Verification of classification performance as AI model by using 100 images





Numerical investigation on the ultimate strength of built-up member with disappeared lacing bars (L.B.)



Frame analysis model of small size suspension bridge

Available Facilities and Equipment

Universal hydraulic testing machine (2000kN capacity)	General purpose finite element analysis program MSC Marc/Mentat
Personal computer (Dell Precision 3640)	Self-made non-linear finite element analysis program
Personal computer (Be-Clia)	Exterior digital caliper gauge (TECLOCK GMD-1J)
Fortran compiler (Intel)	Digital point micrometer (Niigata Seiki MCD232-25P)
General purpose pre and post processor GiD	Portable Data Logger (TML TDS-150)