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Fundamentals and implementations of modeling and simulations.

Documentation of laboratory task no 9.

Title: Images Manipulation

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Field of studies: Informatics (sem.V)

Project Objective:

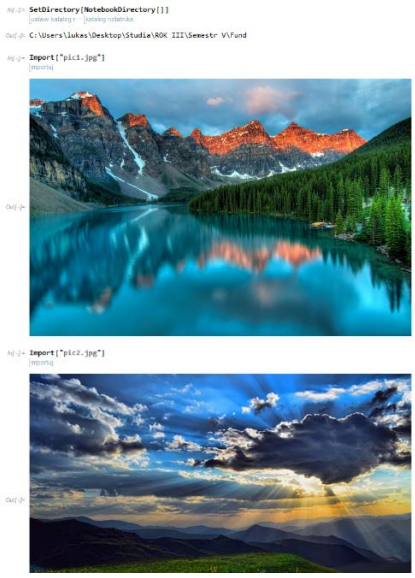
Goal of the task is to enjoy the exploration of possibilities for pictures manipulation offered by Mathematica.

Description:

Select two pictures (for example in .jpg format and of the same sizes, at least at the beginning);

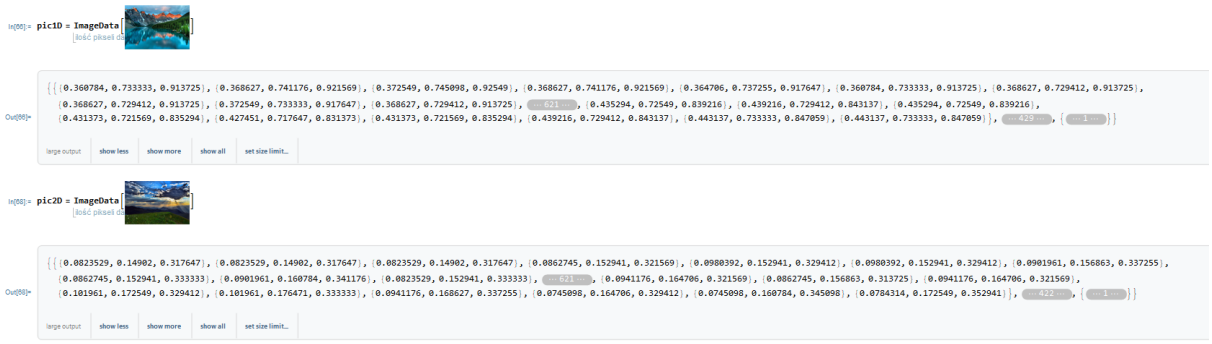
put both pictures and file with the program into one operating directory and define the path to this directory (procedure "SetDirectory[NotebookDirectory[]]");

import both images to Mathematica (function "Import[]"):

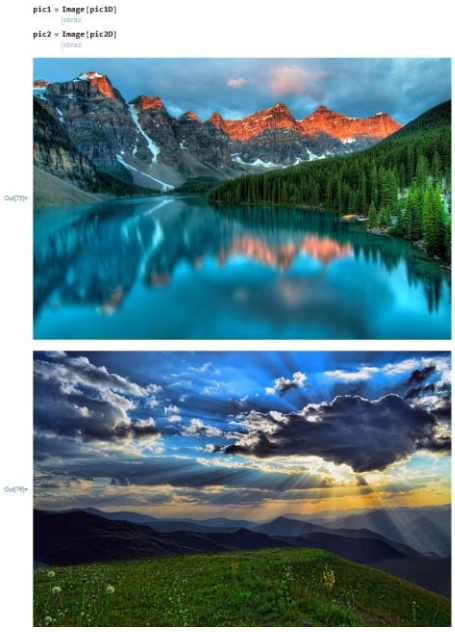


A procedure transforming smoothly one image into another image:

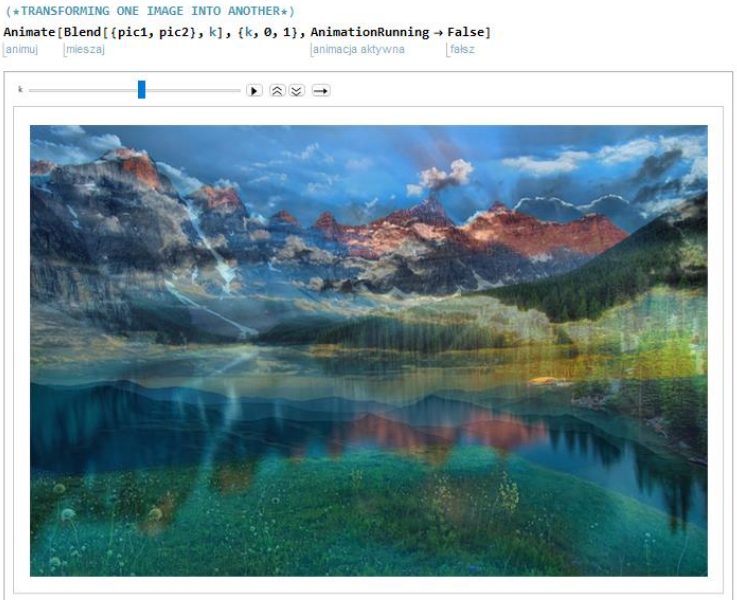
-transform both images into matrices:



-use function "Image[]" to retrieve the images from the matrices:



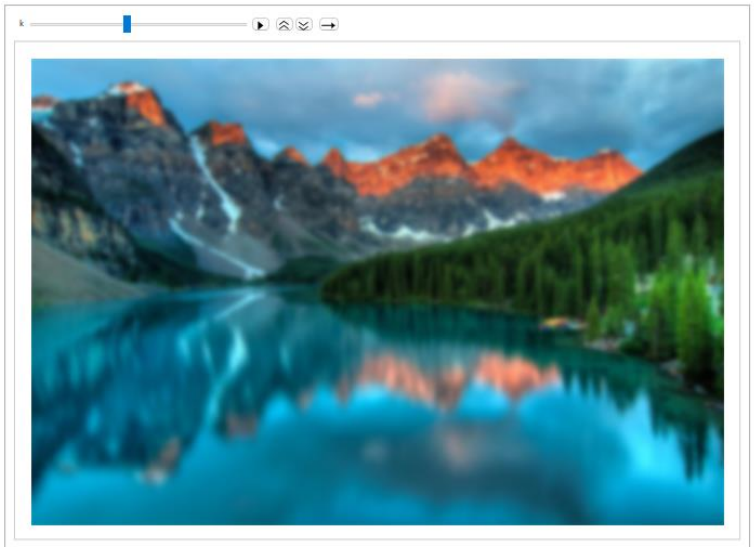
-create an animating procedure overlapping the images so that one image transforms smoothly into another one:



An animating procedure blurring or sharpening the image:

-blurring:

```
Animate[Blur[pic1, k], {k, 0, 10, 0.5}, AnimationRunning → False]
```
animuj | zmniejsz ostrość | animacja aktywna | fałsz

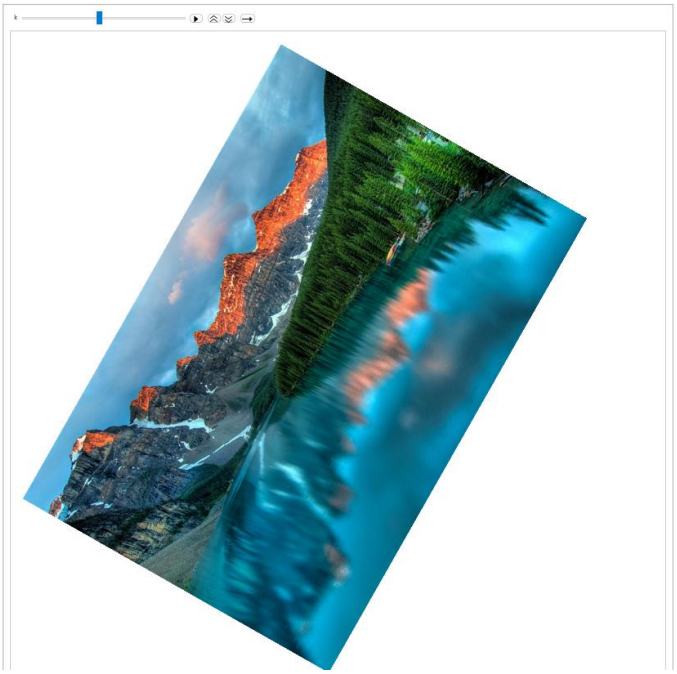


-sharpening:

```
(*SHARPENING IMAGE*)
Animate[Sharpen[pic2, k], {k, 0, 10, 0.5}, AnimationRunning → False]
```
animuj | wyostrz | animacja aktywna | fałsz

An animating procedure rotating the picture around:

```
(*ROTATING IMAGE*)
Animate[Rotate[pic1, k, {0, 1, 0}], {k, 0, 360}, AnimationRunning → False, AnimationRate → .5]
```



Some other procedures:

-splitting the image:

```
ImagePartition[ , Scaled[{1 / 3, 1 / 3}]]
```

-changing colors:

```
Map[ColorCombine, Permutations[%]]
```

-combining the two images:

```
abc = Map[HistogramDistribution[Flatten[#], 256] &, ImageData[pic1, Interleaving → False]];
xyz = Map[HistogramDistribution[Flatten[#], 256] &, ImageData[pic2, Interleaving → False]];
{Tred, Tgreen, Tblue} = MapThread[FunctionInterpolation[InverseCDF[#1, CDF[#2, x]], {x, 0, 1}, AccuracyGoal → 1] &, {abc, xyz}];
res = ImageApply[{Tred[#[[1]]], Tgreen[#[[2]]], Tblue[#[[3]]]} &, pic2];
ImageAssemble[{ImageCompose[pic2, ImageResize[pic1, Scaled[.35]], {Left, Bottom}, {Left, Bottom}], res}]
```

Enclosures:

File with the program(Łukaszek_Artur_proj_9.nb)