영상처리 실제 9주차 실습_주파수영역처리

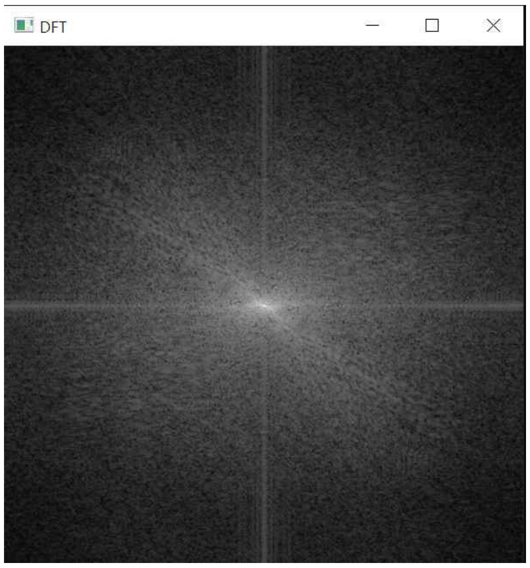
2023254015 장욱진

```
#include <opencv2/opencv.hpp>

using namespace std;
using namespace cv;

void displayDFT(Mat& src)
{
	Mat image_array[2] = { Mat::zeros(src.size(), CV_32F),
Mat::zeros(src.size(),CV_32F) };

	split(src, image_array);
	Mat mag_image;

	magnitude(image_array[0], image_array[1], mag_image);

	mag_image += Scalar::all(1);
	log(mag_image, mag_image);

	normalize(mag_image, mag_image, 0, 1, CV_MINMAX);
	imshow("DFT", mag_image);
	waitKey(0);
}

void shuffleDFT(Mat& src)
{
	int cX = src.cols / 2;
	int cY = src.rows / 2;
	Mat q1(src, Rect(0, 0, cX, cY));
	Mat q2(src, Rect(cX, 0, cX, cY));
	Mat q3(src, Rect(0, cY, cX, cY));
	Mat q4(src, Rect(cX, cY, cX, cY));
	Mat tmp;
	q1.copyTo(tmp);
	q4.copyTo(q1);
	tmp.copyTo(q4);
	q2.copyTo(tmp);
	q3.copyTo(q2);
	tmp.copyTo(q3);
}

Mat getFilter_21(Size size)
{

	Mat tmp = Mat(size, CV_32F);
	for (int i = 0; i < tmp.rows; i++) {
		for (int j = 0; j < tmp.cols; j++) {
			if (j > (tmp.cols / 2 - 10) && j<(tmp.cols / 2 + 10) && i
>(tmp.rows / 2 + 10)) tmp.at<float>(i, j) = 0;
```

```
				else if (j > (tmp.cols / 2 - 10) && j < (tmp.cols / 2 + 10) && i
< (tmp.rows / 2 - 10)) tmp.at<float>(i, j) = 0;
				else tmp.at<float>(i, j) = 1;
			}
		}
		Mat toMerge[] = { tmp, tmp };
		Mat filter;
		merge(toMerge, 2, filter);
		return filter;

}


Mat getFilter_17(Size size)
{
		Mat filter(size, CV_32FC2, Vec2f(0, 0));
		circle(filter, size / 2, 50, Vec2f(1, 1), -1);
		return filter;
}

int page10()
{
		Mat src = imread("./lenna.jpg", CV_LOAD_IMAGE_GRAYSCALE);
		Mat src_float;
		Mat dft_image;

		src.convertTo(src_float, CV_32FC1, 1.0 / 255.0);
		dft(src_float, dft_image, DFT_COMPLEX_OUTPUT);
		shuffleDFT(dft_image);
		displayDFT(dft_image);
		return 1;
}

int page12()
{
		Mat img = imread("./lenna.jpg", IMREAD_GRAYSCALE);
		Mat img_float, dft1, inversedft, inversedft1;
		img.convertTo(img_float, CV_32F);
		dft(img_float, dft1, DFT_COMPLEX_OUTPUT);

		idft(dft1, inversedft, DFT_SCALE | DFT_REAL_OUTPUT);
		inversedft.convertTo(inversedft1, CV_8U);
		imshow("invertedfft", inversedft1);
		imshow("original", img);
		waitKey(0);
		return 0;

}

int page17()
{
		Mat src = imread("./lenna.jpg", IMREAD_GRAYSCALE);
```

```
	Mat src_float;
	imshow("original", src);

	src.convertTo(src_float, CV_32FC1, 1.0 / 255.0);
	Mat dft_image;
	dft(src_float, dft_image, DFT_COMPLEX_OUTPUT);
	shuffleDFT(dft_image);
	Mat lowpass = getFilter_17(dft_image.size());
	Mat result;

	multiply(dft_image, lowpass, result);
	displayDFT(result);
	Mat inverted_image;
	shuffleDFT(result);
	idft(result, inverted_image, DFT_SCALE | DFT_REAL_OUTPUT);
	imshow("inverted", inverted_image);
	waitKey(0);
	return 1;
}

int page21_26()
{
	Mat src = imread("./lunar.png", IMREAD_GRAYSCALE);
	Mat src_float, dft_image;
	imshow("original", src);

	src.convertTo(src_float, CV_32FC1, 1.0 / 255.0);
	dft(src_float, dft_image, DFT_COMPLEX_OUTPUT);
	shuffleDFT(dft_image);
	displayDFT(dft_image);
	Mat lowpass = getFilter_21(dft_image.size());
	Mat result;

	multiply(dft_image, lowpass, result);
	displayDFT(result);
	Mat inverted_image;
	shuffleDFT(result);
	idft(result, inverted_image, DFT_SCALE | DFT_REAL_OUTPUT);
	imshow("inverted", inverted_image);
	waitKey(0);
	return 1;
}

int main()
{
	page10();
	page12();
	page17();
	page21_26();

	return 0;
}
```

결과화면



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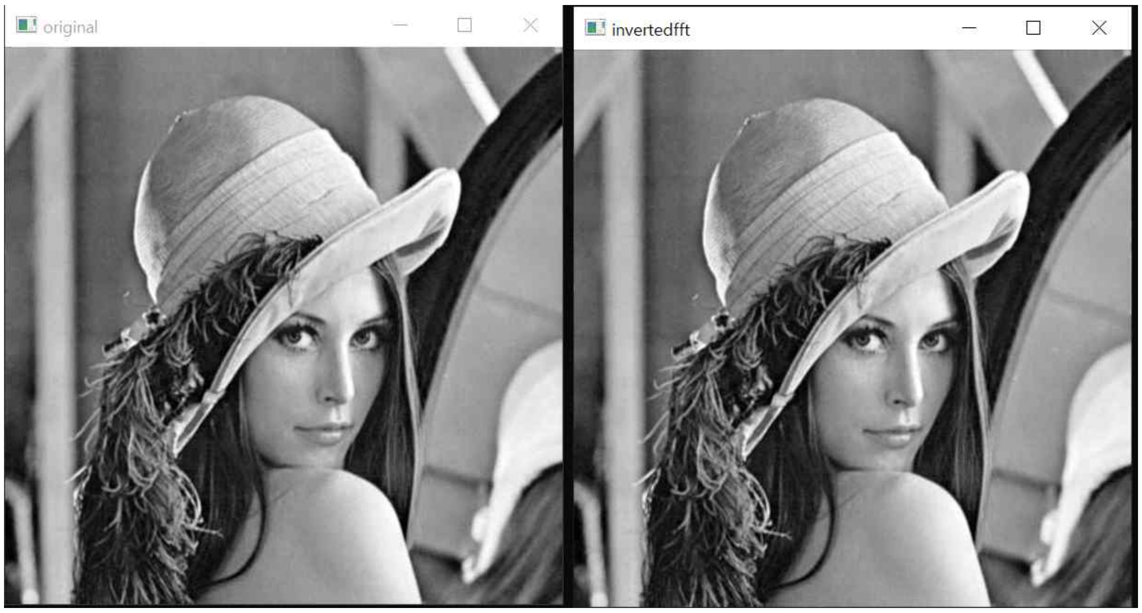

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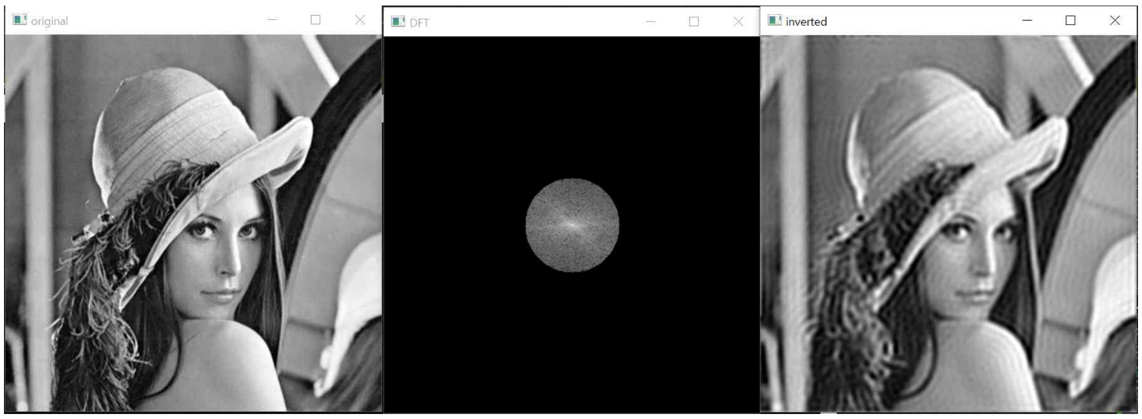

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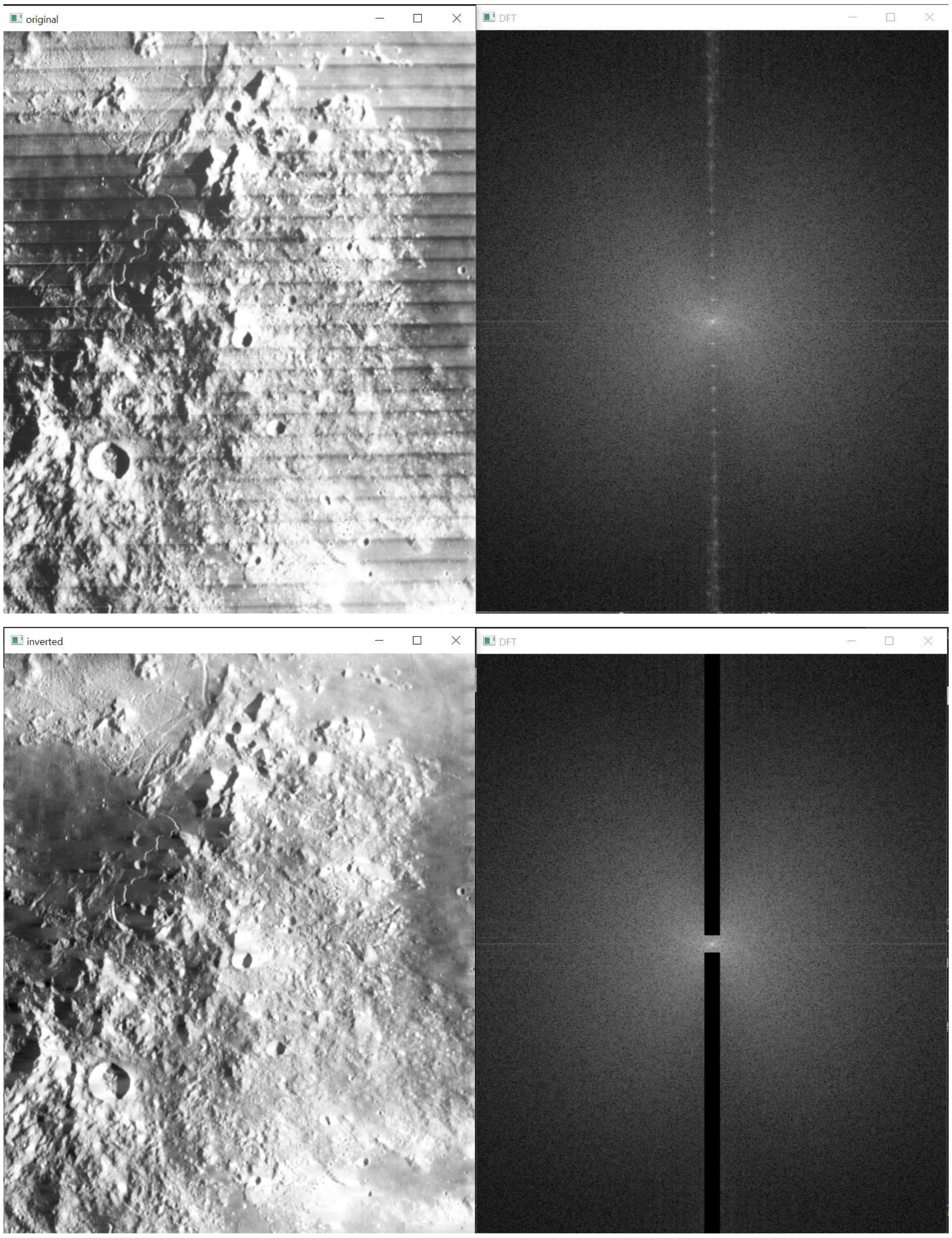
original
DFT
inverted
DFT

<page21-26 결과화면>