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Investigation of Salt Dilution Parameter of the Salted Paper Alternative Process

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Abstract

Photographers usually choose a recipe for their artistic purposes from the many experimented ones of the past 150 years. Unfortunately, these recipes describe only the dilution of the solutions, but do not give a guide how much shall be used for the optimal result for a unit size surface. Besides, each of the transfer processes have a cumulative mapping distortion of the image transfer steps. The aim of this paper is to describe the salted paper technique and to seek the optimal volume of the salt solution for creating proper prints. This article will review the saltprint alternative process, the available large form negative types, the used machines and what we can expect from the result. The final goal is to create a software, that is able to determine the mapping error and produces the inverse of it. By using this inverse function, the original picture can be predistorted in order to make the desired linear transfer of the image onto the paper. Later on, it will be essential to test the optimal amount of the 12% $AgNO_3$ solution, the different paper types, the amount of UV light and the effect of arrowroot gelatin layer or different toners on contrast.

Keywords: image transfer, transfer curve, inverse function, linear transfer, salted paper, alternative processes, UV light

MSC: 49K10 Free problems in two or more independent variables, 49N45 Inverse problems

1. The Salted Paper Process

The saltprint process is one of the oldest known photo process (see [1], [11] and [12]). It was invented by Henry Fox Talbot in 1833. The main difference from Louis Daguerre's process that it is a negative-positive process, on the contrary the daguerreotype is a direct positive process. This way, from the negative we can make positive copies of arbitrary number. The saltprint process has the advantage, that it is possible to make detailed pictures even from hard negatives of strong contrast. There are a lot of further alternative processes giving a good print result, e.g.: kallitype and cyanotype (see [2], [3], [4] and [13]).

2. The Test Negative

We wanted to create a workflow for cheap salted paper image transfer, so we have chosen tracing paper as negative holder. The negative is printed by an HP CM1312 multi purpose machine. A typographic negative on translucent foil will be the monitoring tool for the control experiment. The grayscale image having 256 shades of the black and white transition has a 2 pixels white border and a 2 pixels black border around, respectively from inside to outside (see Figure 1). Figure 2 shows one of the salted paper process image. The european standard A4 paper size was used as the basic unit. We have tested laserjet print on tracing paper and refractory transparent foil, inkjet print on translucent foil and negative foil made by digital press machine (see [5]). The original picture shall be vertically mirrored and inverted in order to get a good digital negative (see [6] and [7]).

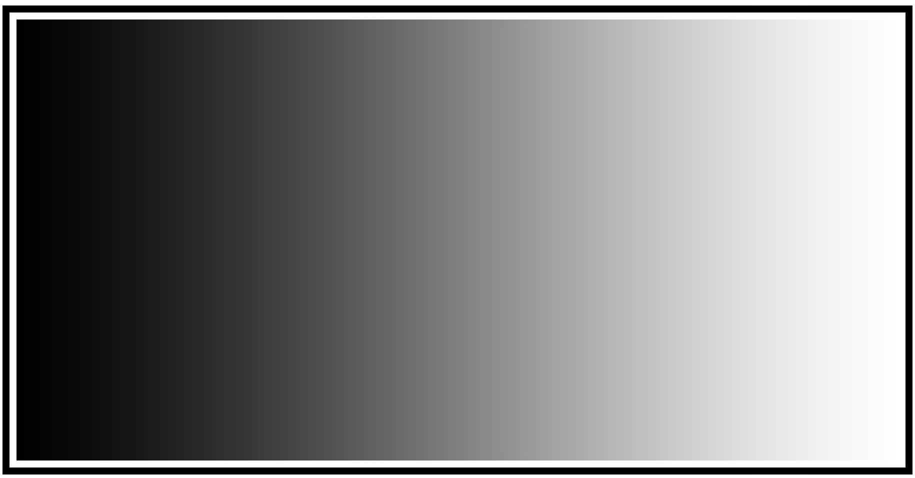

Figure 1: Test negative of 256 gray shades.

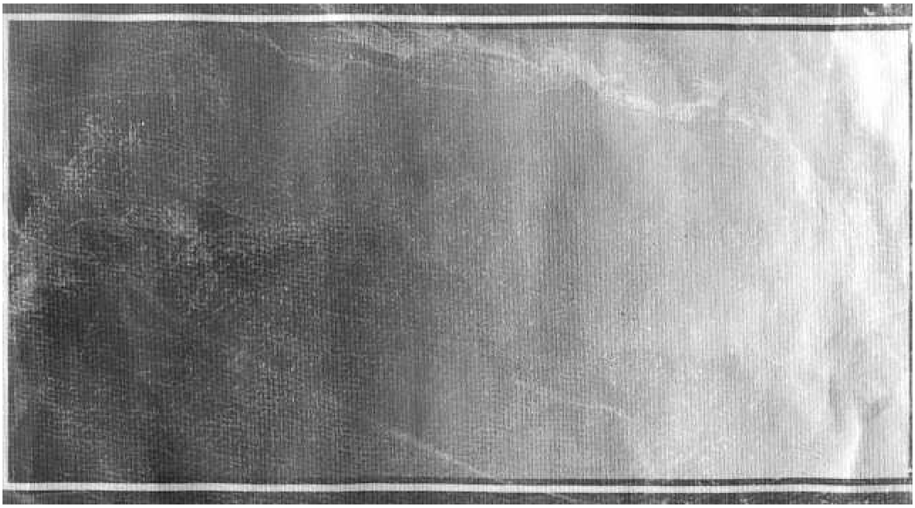

Figure 2: Saltprint of the test negative.

3. The Scanner and the Scanning Error

We have used an Epson V700 flatbed scanner. For the comprehensive tests, the scans were obtained with 600dpi resolution at 48 bit color depth and all the special features were turned off for the best comparable results. The different type A4 sized negatives were scanned back, and we measured the difference from the ideal negative picture. This difference shall take into account at computations of the transfer error.

4. The UV Light Source

The light sources are fixed into an enclosing wood box having the following dimensions: 70cm length, 50cm width and 20cm depth. The flatbed is made of a 4mm glass table. The working area is 60cm times 40cm. The UV light is generated by 2 pieces of 18W power T8 F18W BLB 352-368nm Sylvania UVA Blacklight blue Tungsram neon tubes having diameter of 26mm and 590mm length (see [8]). The tubes are 15cm far away from the flatbed, and there is 8cm gap between them. The top of the machine has 5mm wide sponge for good contact besides the two snap-on locks. 30 seconds of lighting time was applied for each sensitized paper, a Vipo Combi automatic power switch was used to ensure the consistent lighting time.

5. The Paper and the Coating Process

It is essential to choose an acid free paper, otherwise chemicals alter by time what decrease the quality of the prints. Etching and aquarelle papers suit this criteria. The cost effective 150g/m^2 Hahnemühle aquarelle paper was chosen for the tests. It is thick enough to absorb the solutions and cheap enough for daily use. For distributing the salt and the silver a glass rod having 1cm diameter and 30cm length was applied. (Using a paint brush is not a good idea, because of the uneven spread of the layers, and the buffer effect of the hairs which leads to reaction inside the brush.) Later on, we will investigate the effect of a gelatine layer made of arrow roots on the contrast. 6gm citric acid was used for 12gm $AgNO_3$/100cm^3 solution to prevent fog.

6. Processing

The processing has three stages: developing, fixing and washing (see [14]). Figure 3 shows an original digital picture and the salted print image.

Figure 3: Violin original picture and the saltprint.

6.1. Developing

The developing was applied under running tap water, letting the used water flow away. The processing time was 1 minute. This step removes the unnecessary chemicals, and the sepia tone starts to appear.

6.2. Fixing

We have tried to use a 10% solution of sodium thiosulfate (hypo) for fixing. Unfortunately, it provided a lot of dark patches. Instead of this fixing solution, the usage of black and white Tetenal Rapid Fixer solved the darkening problems. Here, the sepia tone is getting stronger, while the dark areas are fainting. The fixing time was 1 minute.

6.3. Washing

30 minutes washing under running tap water ensures the disposal of the fixing chemicals. This guarantees a long life for the prints.

7. Results

Table 1 shows the scanning results determined by Adobe Photoshop CS4 using 11 by 11 Average filter (to compensate the error of the paper texture) at the lightest and darkest areas. It can be read out that the tonal range getting better until 8ml salt solution reached per A4 paper size. After this point, the white tones are getting darker faster than the black tones. By the optimal salt amount, 54.69% of the full tonal range can be used.

Salt solution (ml) ($2gm/100cm^3$)	12% $AgNO_3$ (ml) ($12gm\ AgNO_3/100cm^3$)	Green min. value (0-255)	Green max. value (0-255)	Difference (0-255)
2	6	167	253	86
3	6	138	252	114
4	6	134	251	117
5	6	133	249	116
6	6	110	246	136
7	6	100	239	139
8	6	97	237	140
9	6	96	233	137
10	6	95	224	129

Table 1: Measurement values.

The salt solution was studied in details in this paper. We have determined, that 8ml of 2gm/100ml salt solution yields the best result. After this step, the amount of the optimal Ag volume and lighting time shall be determined. Finally, it will be possible to compute the mapping error (deviation from the ideal linear transform function) and the inverse of it for predistorting the images for creating correct saltprints.

8. Conclusions

The further investigations will determine the optimal Ag volume, and lighting time. After fixing these variables, the transfer curve can be determined. Using a gelatine layer and different toners can improve the contrast of the transfer, and this way the usable grayscale range for the prints (see [9] and [10]).

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References

[1] Richard Farber, Historic Photographic Processes: A Guide to Creating Handmade Photographic Images, *Allworth Press; 1st edition, ISBN-13: 978-1880559932*, (October 1, 1998) 33–44.

[2] Szöllősy Kálmán - Csörgeő Tibor Dr., Képmódosító eljárások, *Műszaki Könyvkiadó, Budapest*, (1965), 9–30.

[3] Jill Enfield, Photo-Imaging: A Complete Visual Guide to Alternative Techniques and Processes (Photography for All Levels: Advanced), *Amphoto Books, ISBN-13: 978-0817453992*, (May 1, 2002)

[4] Christopher James, The Book of Alternative Photographic Processes, *Delmar Cengage Learning; 2 edition, ISBN-13: 978-1418073725*, (February 12, 2008)

[5] Dan Burkholder, Making Digital Negatives for Contact Printing, *Bladed Iris Press; 2nd edition, ISBN-13: 978-0964963863*, (April 1999)

[6] Tony Worobiec, Black & White Photography in a Digital Age: Creative Camera, Darkroom and Printing Techniques for the Modern Photographer, *David & Charles; 2nd edition, ISBN-13: 978-0715325629*, (May 15, 2007) 130–143.

[7] Brad Hinkel and Ron Reeder, Digital Negatives: Using Photoshop to Create Digital Negatives for Silver and Alternative Process Printing, *Focal Press; 1st edition, ISBN-13: 978-0240808543*, (November 28, 2006) 9–22.

[8] Dr Sevcsik Jenő, Gyakorlati fényképezés, *Műszaki Könyvkiadó, Budapest*, (1961), 73–74.

[9] Angela Cartwright, Mixed Emulsions: Altered Art Techniques for Photographic Imagery, *Quarry Books, ISBN-13: 978-1592533695*, (November 1, 2007) 24–55.

[10] Laura Blacklow, New Dimensions in Photo Processes, Fourth Edition: A Step by Step Manual for Alternative Techniques, *Focal Press; 4 edition, ISBN-13: 978-0240807898*, (March 30, 2007) 32–62.

[11] `http://w3.enternet.hu/kgj/saltedpaper.htm`
Writer: Kerekes Gabor, Photographer

[12] http://archfoto.freeblog.hu/tags/historikus_fototechnikák/
Writer: Flesch Bálint

[13] http://archfoto.atspace.com/receptek.html
Writer: Flesch Bálint

[14] http://www.alternativephotography.com/process_saltprints.html
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