



Fälschen Modern Smartphones Automatisch Bilder?

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Multimedia Security Group @ Informatik 1

Department of Computer Science

Friedrich-Alexander University Erlangen-Nürnberg (FAU)

Historisches Beispiel: Auf dem Berliner Reichstag



„Auf dem Berliner Reichstag, 2. Mai 1945“ von Jewgeni Chaldej

Mehrere Versionen des Bildes / der Bilderserie



Wegretuschierte Uhr



Практически все стало, так сказать, 23-4 1945 ИТАЛИИ

Огонёк

№ 19 (910)
Воскресенье, 13 мая 1945 года

Следующий номер «Огонёк» посвящается всенародному Празднику Победы над немецко-фашистскими захватчиками

В номере:

ПРОЗА:
А. Шолох.— Последний путь. А. Лукич.— Злой дух.

СТИХИ:
Валентин Тертыч.— Сказка Сильвестра Павли Тертыча.— Стих о войне.

ОЧЕРКИ:
Е. Савинков.— Прощай, Ева. Болотников.— Конец войне. В. Жуковский.— Закрыты жалюзи.

ФОТОРЕПОРТАЖ:
Е. Халдей и Д. Чернов (ТАСС)— Вечера Ф. Келло, Г. Жерома и В. Петрова.— Парус арктических исследователей. Дела и люди Советской страны. С. Финляндия.— Творчество молодежи.

ЛИТЕРАТУРА И ИСКУССТВО:
А. Тертыч.— У истоков художника. Д. Звонков.— Заметки зоолога корреспондента.

ЮМОР:
С. Котляр.— Как я познакомился с англичанином.

НАУКА И ТЕХНИКА

ВО РОДНОЙ ЗЕМЛЕ

СТО ЛЕТ НАЗАД

ПЯТЬДЕСЯТ ЛЕТ НАЗАД

ШАХМАТЫ

ШАШКИ

КРОССВОРД

ЗНАМЯ ПОБЕДЫ НАД БЕРЛИНОМ!



Алое знамя развевается над руинами, в центре финской столицы — Берлине. Берлин пад! Он лежит проклятый у ног советских воинов-победителей. Нет больше гитлеровского, финского Берлина, этого оплота международной реакции, очага национальной агитации. Красная Армия не только одержала великую историческую победу в битве за Берлин: она принесла несражающему нацистскому оккупационному от финского народа. День 2 мая 1945 года навсегда войдет в историю, его будут помнить в веках.

Фото Е. Халдей (ТАСС)



Aktuelle Wissenschaft zu Super-Resolution

Handheld Multi-Frame Super-Resolution

BARTLOMIEJ WRONSKI, IGNACIO GARCIA-DORADO, MANFRED ERNST, DAMIEN KELLY, MICHAEL KRAININ, CHIA-KAI LIANG, MARC LEVOY, and PEYMAN MILANFAR, Google Research



Fig. 1. We present a multi-frame super-resolution algorithm that supplants the need for demosaicing in a camera pipeline by merging a burst of raw images. We show a comparison to a method that merges frames containing the same-color channels together first, and is then followed by demosaicing (**top**). By contrast, our method (**bottom**) creates the full RGB directly from a burst of raw images. This burst was captured with a hand-held mobile phone and processed on device. Note in the third (red) inset that the demosaiced result exhibits aliasing (Moiré), while our result takes advantage of this aliasing, which changes on every frame in the burst, to produce a merged result in which the aliasing is gone but the cloth texture becomes visible.

Compared to DSLR cameras, smartphone cameras have smaller sensors, which limits their spatial resolution; smaller apertures, which limits their light gathering ability; and smaller pixels, which reduces their signal-to-noise ratio. The use of color filter arrays (CFAs) requires demosaicing, which further degrades resolution. In this paper, we supplant the use of traditional demosaicing in single-frame and burst photography pipelines with a multi-frame super-resolution algorithm that creates a complete RGB image directly from a burst of CFA raw images. We harness natural hand tremor, typical in handheld photography, to acquire a burst of raw frames with small offsets. These frames are then aligned and merged to form a single image with red, green, and blue values at every pixel site. This approach, which includes no explicit demosaicing step, serves to both increase image resolution and boost signal to noise ratio. Our algorithm is robust to challenging scene conditions: local motion, occlusion, or scene changes. It runs at 100 milliseconds per 12-megapixel RAW input burst frame on mass-produced mobile phones. Specifically, the algorithm is the basis of the *Super-Res Zoom* feature, as well as the default merge method in *Night Sight* mode (whether zooming or not) on Google's flagship phone.

CCS Concepts: • **Computing methodologies** → **Computational photography**; **Image processing**.

Additional Key Words and Phrases: computational photography, super-resolution, image processing, photography

ACM Reference Format:

Bartłomiej Wróński, Ignacio Garcia-Dorado, Manfred Ernst, Damien Kelly, Michael Krainin, Chia-Kai Liang, Marc Levoy, and Peyman Milanfar. 2019. Handheld Multi-Frame Super-Resolution. *ACM Trans. Graph.* 38, 4, Article 28 (July 2019), 18 pages. <https://doi.org/10.1145/3306346.3323024>

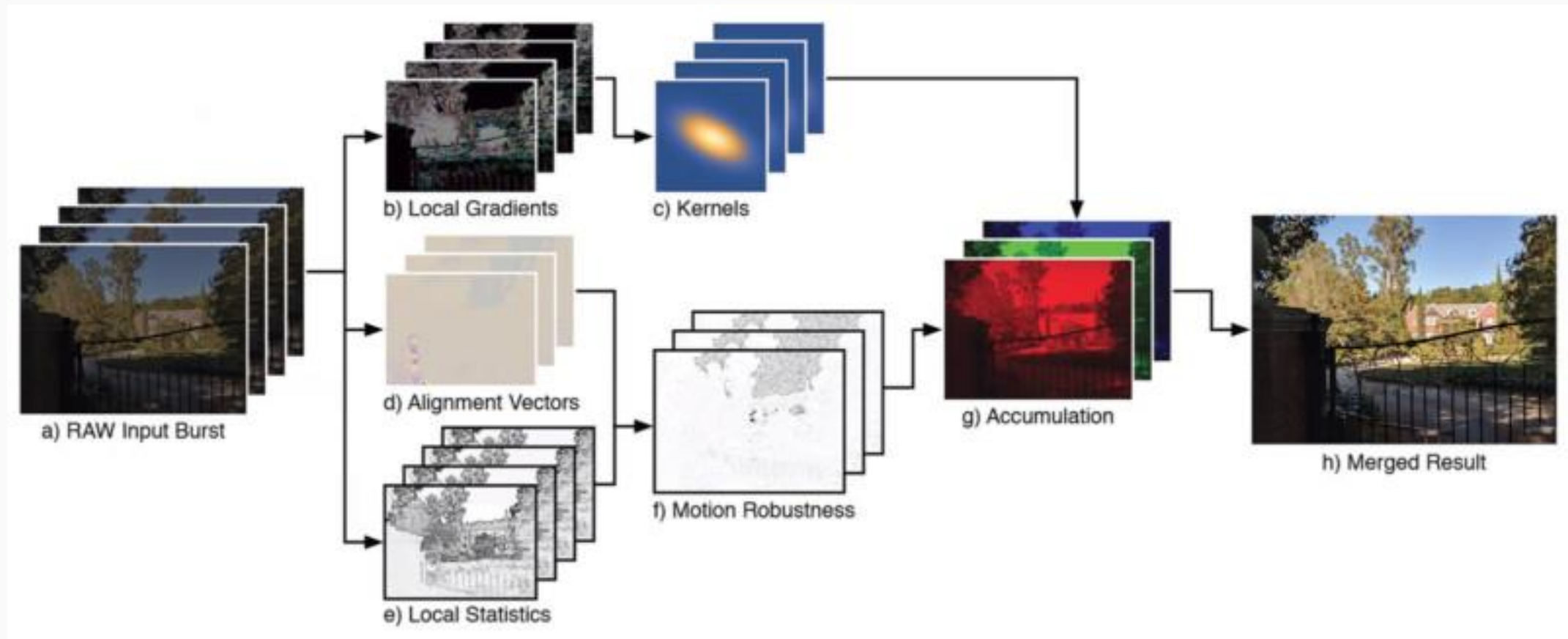
1 INTRODUCTION

Smartphone camera technology has advanced to the point that taking pictures with a smartphone has become the most popular form of photography [CIPA 2018; Flickr 2017]. Smartphone photography offers high portability and convenience, but many challenges still exist in the hardware and software design of a smartphone camera that must be overcome to enable it to compete with dedicated

Beispiel Super-Resolution



Algorithmik – Ausnutzen vom “Zittern” der Hand beim Fotografieren



- Video zu der Arbeit:

https://www.youtube.com/watch?v=iDn5HXMQNzE&feature=emb_title

- Die Technik basiert darauf, dass

aus **mehreren leicht verschobenen Einzelbildern** ->

ein **“zusammenkopiertes”** hochaufgelöstes Ausgabebild erzeugt wird

- Das funktioniert

- sowohl bei *statischen Szenen* funktioniert, als
- auch *dynamischen Szenen*

Der Algorithmus wird auf Smartphones verwendet

Specifically, the algorithm is the basis of the Super-Res Zoom feature, as well as the default merge method in Night Sight mode[...] on Google's flagship phone.

Handheld Multi-Frame Super-Resolution

BARTLOMIEJ WRONSKI, IGNACIO GARCIA-DORADO, MANFRED ERNST, DAMIEN KELLY, MICHAEL KRAININ, CHIA-KAI LIANG, MARC LEVOY, and PEYMAN MILANFAR, Google Research



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Diskussion

Frage:

Ist ein Foto aus einem solchen Algorithmus nun eine Manipulation?

Wie wurden früher entschieden, ob ein Foto manipuliert ist?

