OCR ON IOS

OPTIONS AND LIMITATIONS

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- iOS
- ruby on rails
- Łódź wiOSłuje
- @kamelury

agenda

1. Łódź wiOSłuje
2. Why OCR?
3. How is OCR done?
4. OCR image preprocessing
5. OCR engine options
6. finally: conclusions, announcements and questions

1. ŁÓDŹ WIOSŁUJE

Łódź wiOSŁuje

kamelury.github.io/lodzwiosluje

Łódź wiOSŁuje

kamelury.github.io/lodzwiosluje

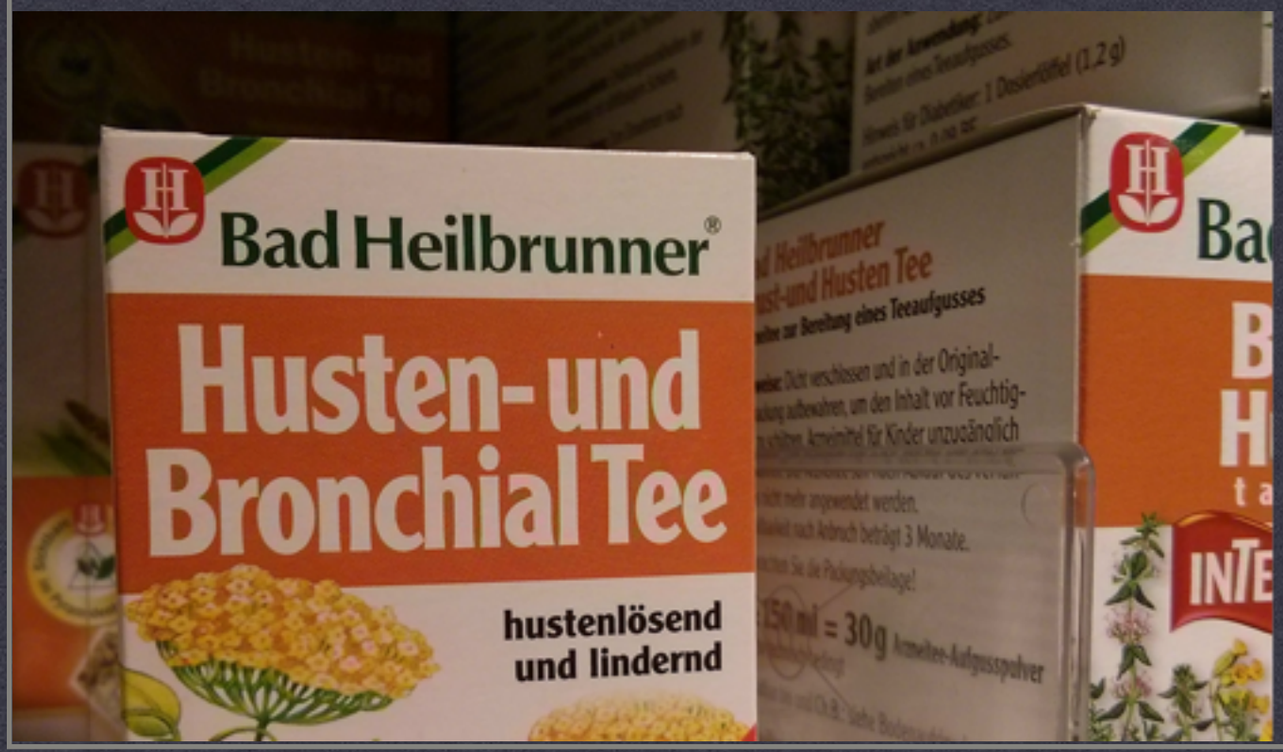
2. WHY OCR?

why talk about an old and solved problem?

- scanners vs digital cameras
- new possibilities
- Swift!
- recent Google acquisition of Quest Visual

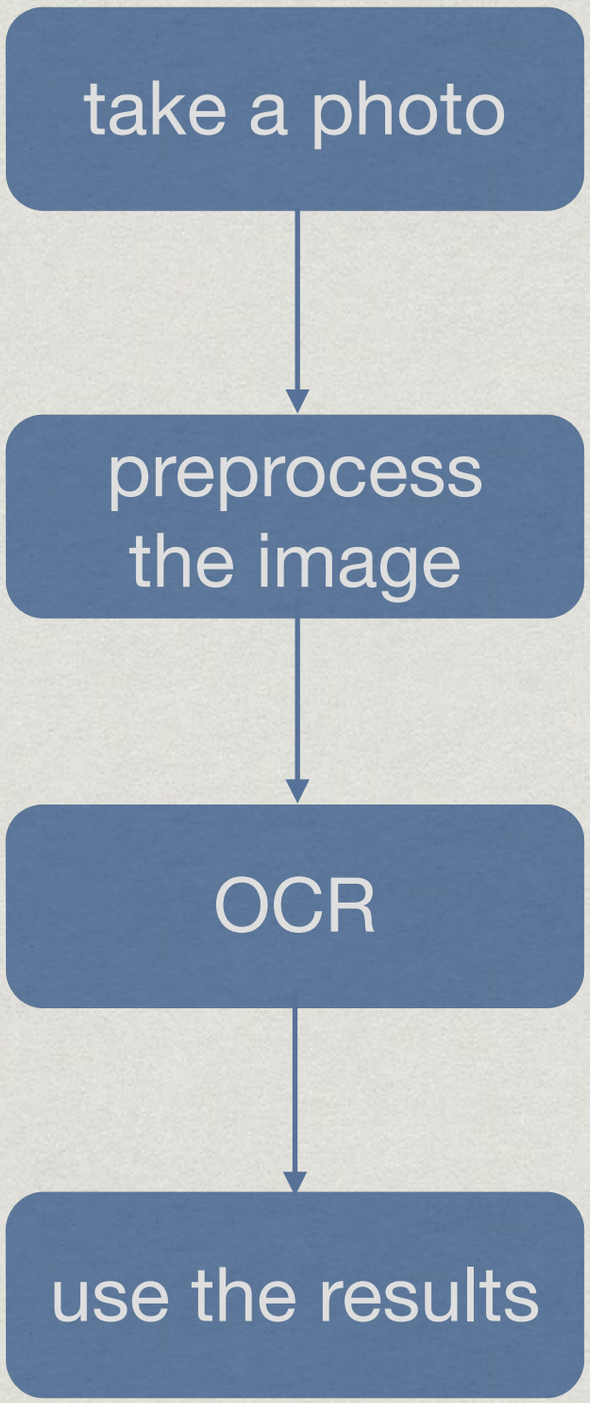
Photo

Word Lens

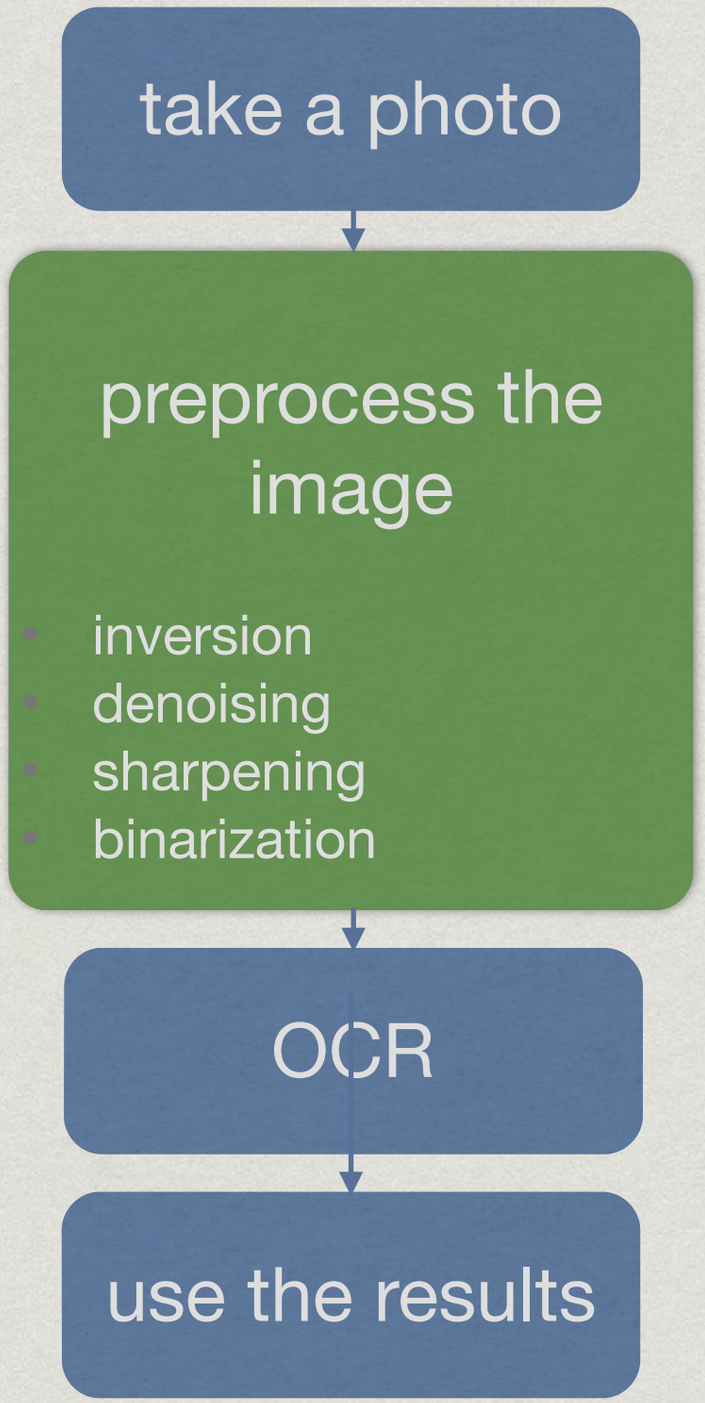


3. HOW IS OCR DONE?

OCR



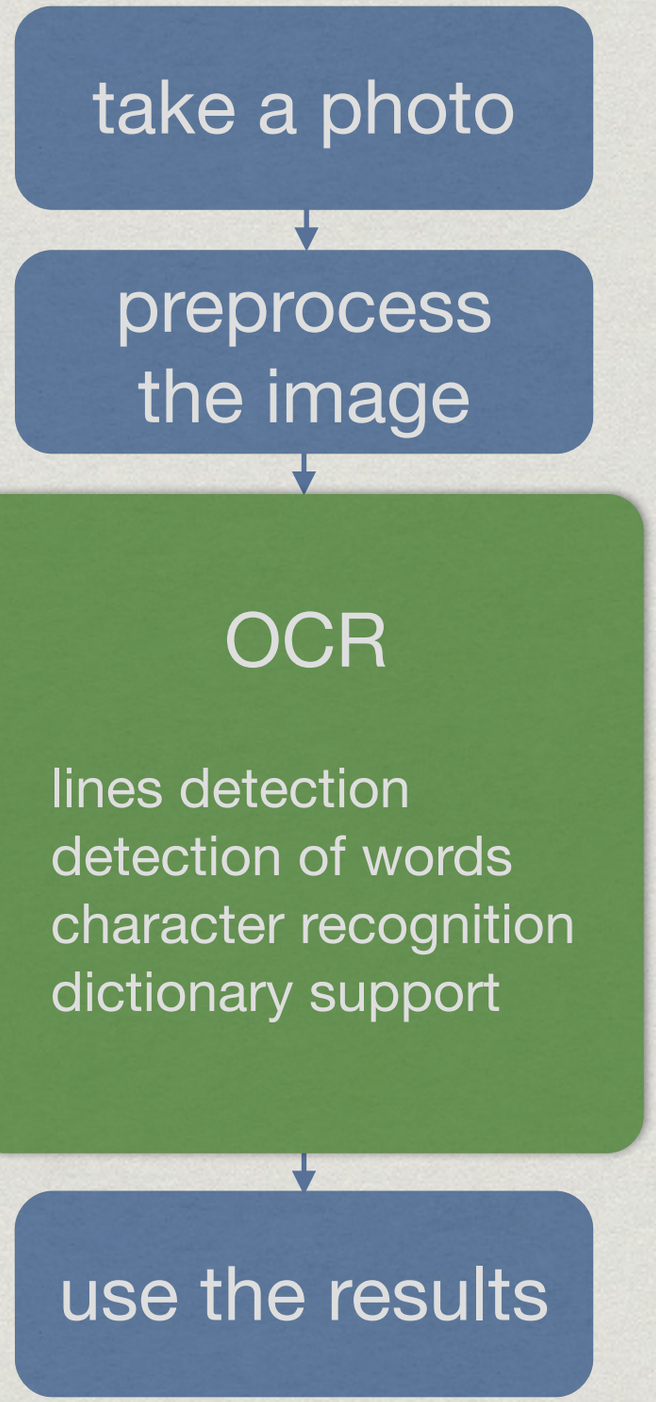
OCR


take a photo
preprocess the image
inversion
denoising
sharpening
binarization
OCR
use the results

Binarization

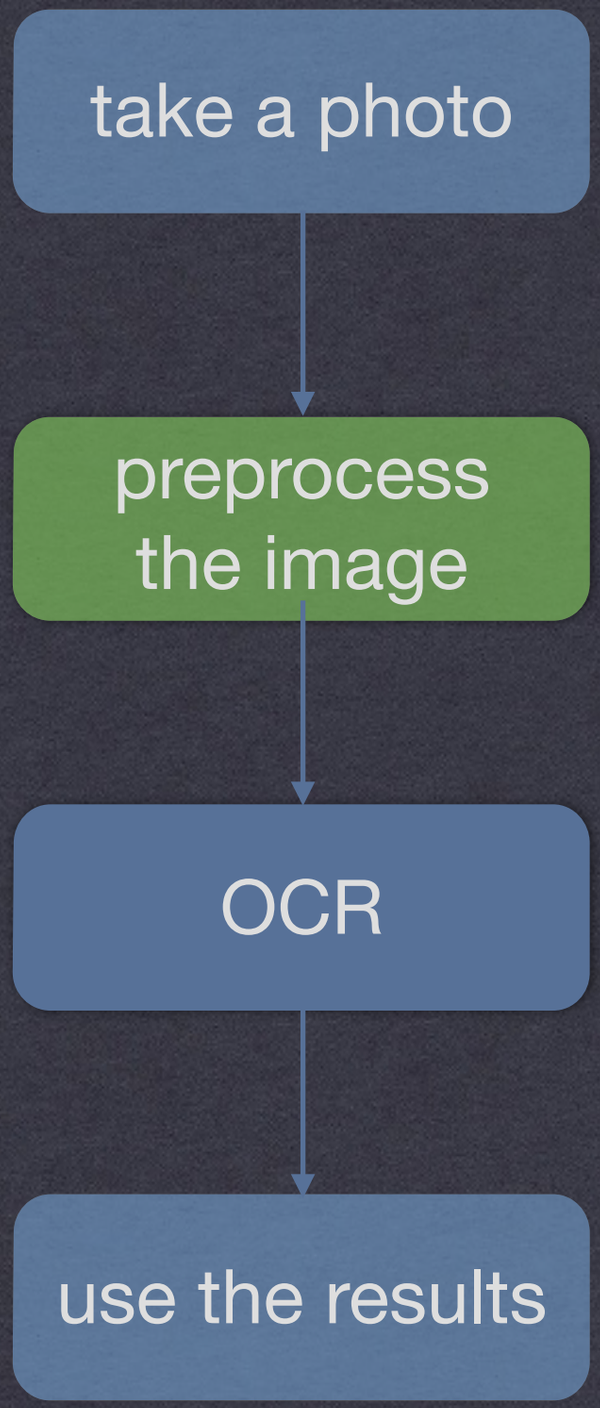
source: http://www.nicomsoft.com/optical-character-recognition-ocr-how-it-works/

OCR


take a photo
preprocess the image
OCR
lines detection
detection of words
character recognition
dictionary support
use the results

HOW CAN WE GO ABOUT IT ON IOS?

4. IMAGE PROCESSING



CoreImage

- *„Core Image is an image processing and analysis technology designed to provide near real-time processing for still and video images.”*
- CIFilters:
  - **CIMedianFilter** (reduce noise)
  - **CINoiseReduction** (Small changes in luminance below that value are considered noise and get a noise reduction treatment, which is a local blur. Changes above the threshold value are considered edges, so they are sharpened.)
  - **CISharpenLuminance** (Increases image detail by sharpening)
  - **CIColorMap** (B&W)

source: https://developer.apple.com/library/mac/documentation/graphicsimaging/reference/CoreImageFilterReference/Reference/reference.html#//apple_ref/doc/filter/ci/CINoiseReduction

OpenCV for iOS

- *„OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library.”*
- recognize faces, identify objects,
- classify human actions in videos, track camera movements,
- track moving objects, extract 3D models of objects
- pod 'OpenCV'
- we need C++ => https://github.com/foundry/OpenCVSwiftStitch

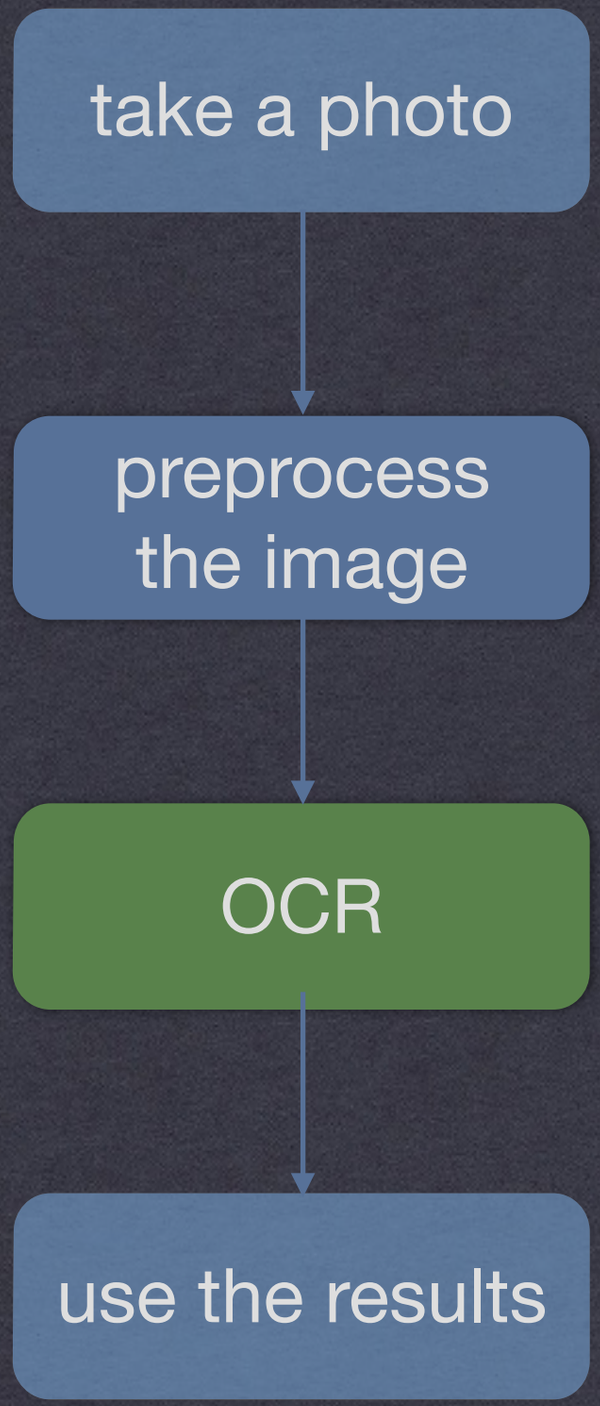
source: http://opencv.org/about.html

ImageMagick for iOS

- *„ImageMagick® is a software suite to create, edit, compose, or convert bitmap images”*

- pod ‚ImageMagick’
- #import <MagicWand.h>
- https://github.com/marforic/imagemagick_lib_iphone

5. OCR ENGINES



OCR engines for iOS

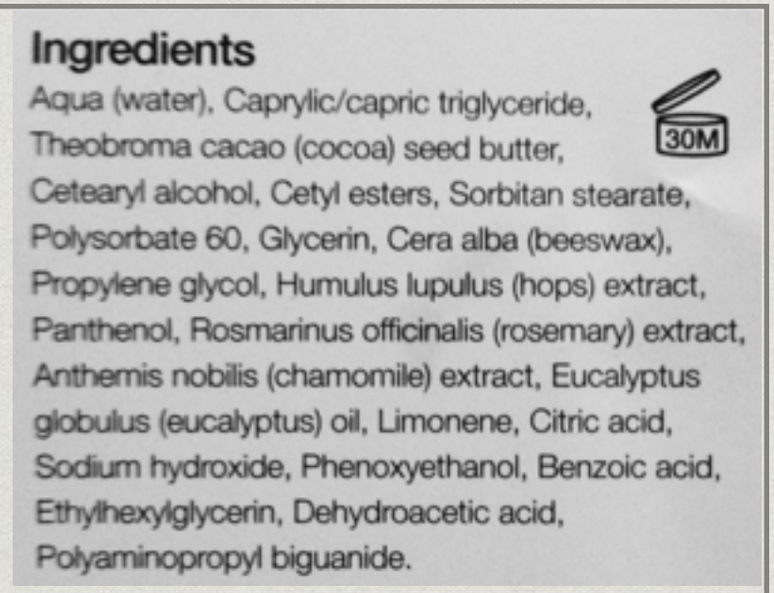
	Tesseract	LEADTOOLS	ABBYY
license	open source (since 2005)	proprietary (starting from 2.179,00+ 724 €)	proprietary (starting from 4.900 €)
started	1985	1990	1989
handwriting recognition	no	yes	yes
languages	64	40 +	202(OCR) 136(ICR)
trial		60 days	30 days
cloud		YES	YES

Tesseract

- open source
- started at HP in the mid 80s
- maintained by Google (used for book scan project)
- 70% accuracy without image preprocessing
- version 2.22 compiled for iOS (current version 3.03)

```
//Podfile
platform :ios, '8.0'
inhibit_all_warnings!

pod 'TesseractOCRiOS', '~> 2.22’


//kwScanner-Bridging-Header.h
#import <TesseractOCR/TesseractOCR.h>


//KWScannerViewController.swift
class KWScannerViewController: TesseractDelegate {
  func recognizeImage (image: UIImage) -> Void {

   let tesseract : Tesseract  = Tesseract(language: "eng")
   tesseract.delegate = self

   tesseract.setVariableValue("abcdefghijklmnopqrstuwxyz,()/01234567890",
  forKey:"tessedit_char_whitelist")
   tesseract.image =  image
   tesseract.recognize()
   ocrResult =  tesseract.recognizedText

  }
}
```

results



Tesseract (raw engine results)
ingredients

aqua (water), tiapryiic/capric trigiyoeride, ihedxoma cacao (cocoa) seed butter, 53m cetearyi aioohoi, cetyi esters, sorbitan stearate, iioiete 50, eiycerin, cera aiba (beeswax), iiiropyiene giycol, iiumuius iupuius (hops) extract, (…) iiiosmarinus ofiicinaiis (rosemary) extract, mithemea nobiiis (chamomile) extract, iiucaiyptus gobuius (eucalyptus) oil, umonene, citric acid, sudan hydroxide, i3henoxyethanoi, 8enzoic acid, (…) 0ehydroacetic acid,

(…)biguanidei

Leadtools (free iOS app of engine owner)
Ingredients
Aqua (voter), Caprylic/capric triglyceride, Thewbroma cacao (cocoa) seed butter, IWW Oetearyl alcohol, Cetyl esters, Sorbitan stearate, Polysorbate 60, Glycerin, Cern alba (beeswax), Propylme glycol, Humulus lupulus (hops) extract, Parrtherd, Rosmarinus ofticinalis (rosemary) extract, Anthemis nobilis (chamomile) extract, Eucalyptus globules (wcdyptus) oil, Limonene, Citric acid, Sodium hydroxide, Phenoxyethanol, Benzoic acid, Elhyirexylglycerin, Dehydroacetic acid, Poli/afmmr>f<>r>vi biguanide.

ImageToText (server processing)
Ingredients
Aqua (water). Caprylic/capric triglyceride,
Theobroma cacao (cocoa) seed butter,
Cetaaryl alcohol. Cetyl esters, Sorbitan s(…)
Polywrbate 60, Glycerin, Cara alba (bee:(…)
Propylene glycol, Humulus lupulus (hops(…)
Panthenol, Rosmarinus offioinalis (rosemi(…)
Anthemis nobilis (chamomile) extract, Eu(…)
globulus (eucalyptus) oil, Limonene, Cltri<(…)
Sociirn hydroxide, Phenoxyethanol, Ben(…)
n(…), Dehydroaoetic acid,
(…)biguanlde.
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ScannerWith OCR (paid, Latin language support)
Ingredients Aqua (water), Caprylicicapric triglyceride, Theobroma cacao (cocoa) seed butter, Cetearyl alcohol, Cetyl esters, Sorbitan stearate, Polysorbate 601 Glycerin, Cera a(.)ba (beeswax), Propyiene glycol, Humulus lupulus (hops) extract, Panthenol. Rosmarinus officinalis (rosemary) extract, Anthemis nobilis (chamomile) extract, Eucalyptus globuius (eucalyptus) oil, Limonene, Citric acid, Sodium hydroxide, Phenoxyethanol, Benzoic acid, Ethythexylgtycerin, Dehydroacetic acid, Potyaminopropyl biguanide.

6. SUMMARY

OCR on iOS

image processing

- resolution inversion
- denoting
- sharpening
- binarization

- CoreImage
- OpenCV
- ImageMagick

OCR engine

- lines detection
- detection of words
- character recognition
- dictionary support

- Tesseract
- Leadtools
- ABBYY

LIMITATIONS

- image quality
- dictonary
- fonts
- OCR engines availability for mobile
- Swift? :)

Feedback welcome

- You know something about OCR I didn’t mention and you want to discuss it.
- You have some ideas for OCR apps on mobile devices.
- You know excellent apps using OCR technology.
- slides: kamelury.github.io/lodzwiosluje

SWIFT CRUNCH

Kraków, July 5th & 6th

Code with Ash Furrow, Kyle Fuller and other top iOS hackers, share impressions and discover Swift - its strengths and shortcomings. Join us in Krakow, Poland for the first-ever Swift hackathon!


Ash Furrow


Kyle Fuller


Wiktor Gworek


Kamil Burczyk


Maciej Konieczny

www.swiftcrunch.com

QUESTIONS?