FRIEDRICH-ALEXANDER
UNIVERSITÄT
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TECHNISCHE FAKULTÄT

Status Masterarbeit

Themen

- Stand des Papers
- VPN-Zugang
- Anmeldung der Arbeit

- Ursachen von Abweichungen in der Kalibrierung
  - Weiterführung?
  - Aufnahme in die Arbeit

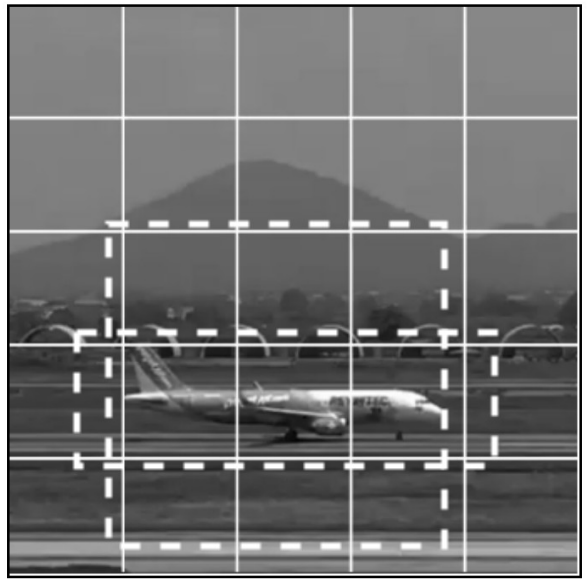
- Konzept zu Detection und Matching
- Zeitplan

Konzept Detection

5.2 Feature or Object Detection

The task of image classification with localization describes the problem at hand as close as possible. Two possible approaches are made:

- State of the art object detection (center, bounding box, class) could be used. In a first approach there would only one class to detect. In a second approach each laser point could be assigned a class according to its position in the grid. The task of matching would then already be incorporated. Common architectures are:
  - You Only Look Once (YOLO)
  - Regions with Convolutional Neural Networks (R-CNN)
- A point detection (center only) could be carried out with a regression as it was done for anterior and posterior points. The architecture EfficientNet is promising. Non present ROIs will me mapped to (0,0) at first.



Konzept Matching

5.3 Feature Matching

We want to find the correspondence between a detected point and a node in an uniform grid. The following approach could be carried out:

1. A morphing is carried out with an autoencoder neural network. Each detected point in the input image is a feature. The image will be morphed such that in the output image all features have predefined coordinates with uniform spacing.

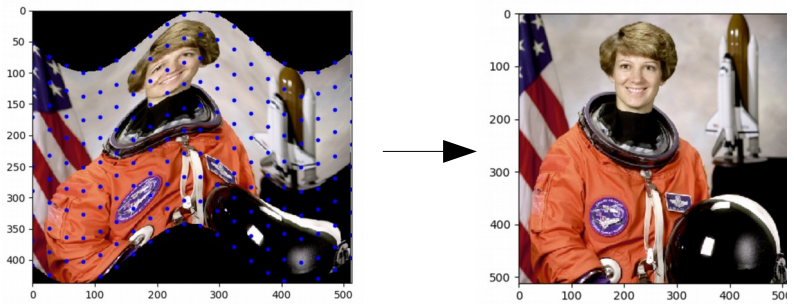
2. Feature detection will be carried out. For the original image feature detection is described in the previous section. The feature detection for the morphed image is trivial, as coordinates are predefined.

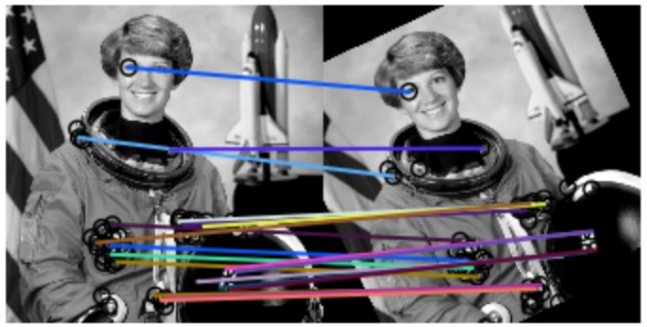
3. A feature descriptor will be determined for each feature, that is a feature vector describing the neighborhood of the feature. The SIFT could be a good descriptor?

4. A feature matching will be carried out that finds correspondences, that is for example the nearest neighbor of the feature vectors.

Prior to the approach we should find out if the feature matching is als applicable for the this ”nonrigid registration” as in the lecture MIPIA tasks were mostly rigid registration.

Piecewise affine transformation





* 2 - 3 also as DL task?
* Can we enhance 1 such that Features can also be input and output?

Zeitplan

Projektplan: Key Point Detection using Neural Networks for Endoscopic 3D Reconstruction

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Betreuung:	Andreas Kist
Datum:	4/7/2020

Phase	Nr.	Arbeistabschnitt
Defintion	01	Orientierung
	02	Methoden zur Erkennung und Registrierung erarbeiten
	03	Kalibrierungsalgorithmus anpassen
	04	Glabel Programm entwickeln
Entwurf	05	Netzwerke implementieren
	06	Daten Labeln
Realisierung	07	Netzwerke trainieren
	08	Bildverarbeitungskette aufbauen
	09	Kalibrierungsalgorithmus einfügen
	10	Rekonstruktionsalgorithmus einfügen
Dokumentation	10	Software dokumentieren
	11	Masterarbeit erstellen
	12	Präsentation erstellen
Begleitprozesse	13	Literaturrecherche