



Chair for Computer Aided Medical Procedures (CAMP)
Master Seminar on
Deep Learning for Medical Applications

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Technische Universität München

Team

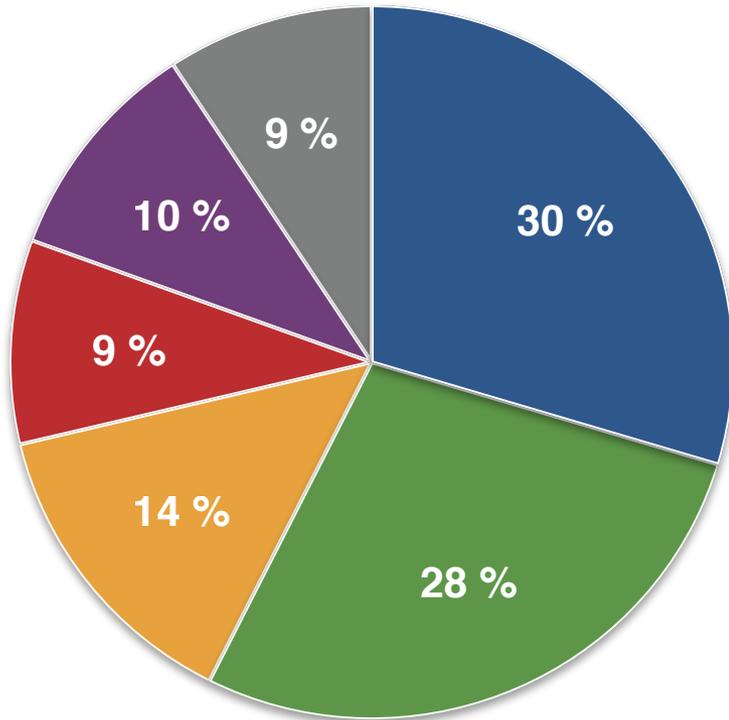
- Prof. Nassir Navab
- Course organizer:
 - Dr. Shadi Albarqouni
 - Email: shadi.albarqouni@tum.de
 - Webpage: <http://campar.in.tum.de/Main/ShadiAlbarqouni>
- Tutors:
 - Ashkan Khakzar
 - Ari Tran



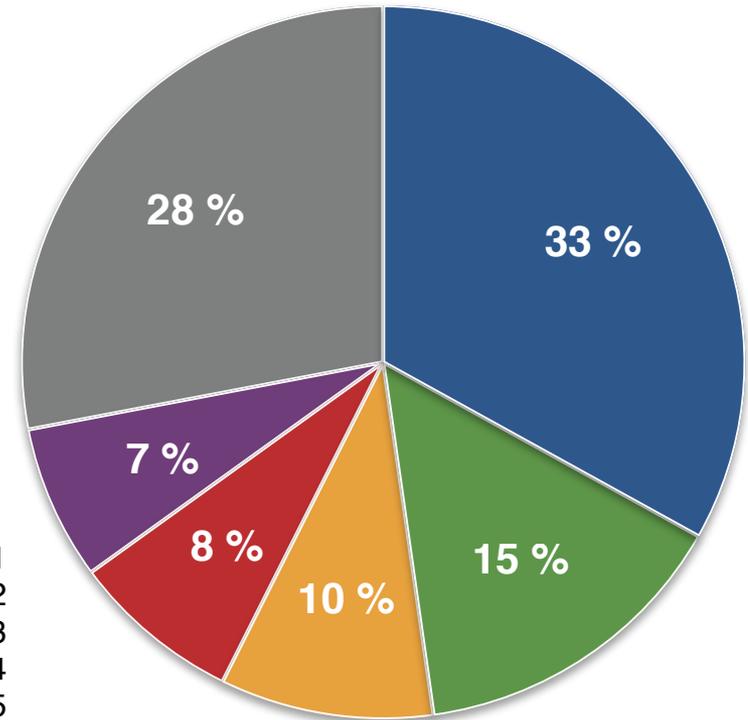
Popularity?

obtained via matching.in.tum.de

108 Applicants in WS17



157 Applicants in SS18



- Rank #1
- Rank #2
- Rank #3
- Rank #4
- Rank #5
- rest



Deep Learning Activities @CAMP, TU Munich

<https://prezi.com/rancb7fbzuam/deep-learning-activities-at-camp/>

Deep Learning Papers on Medical Image Analysis

<https://github.com/albarqouni/Deep-Learning-for-Medical-Applications>





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Course Regulations



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Basic Info about the course

- **Type:** Master Seminar (IN2107)
- **Language:** English
- **SWS:** 2
- **ECTS:** 5 Credits
- **Webpage:**
 - <http://campar.in.tum.de/Chair/TeachingSs19DLMA> (files are password-protected)
- **Time:**
 - Thursdays, 12-14
- **Location:**
 - CAMP Seminar Room (03.13.010)
- **Requirements:**
 - **Good Background in Machine/Deep Learning methods.**



Objective

- Learn through **read, understand, present, and discuss** many challenges present in Medical Applications:
 - Understanding and Interpreting Predictive Models
 - Handling few amount of labeled data → *Transfer Learning, Semi-/Weakly- Supervised Learning*
 - Handling class Imbalance → *Special loss functions*
 - Handling Multi-Modal Data → *Graph Convolutional Networks*
 - Handling Intra/Inter-Scanners Variability → *Domain Adaptation*
 - Incorporating Prior Knowledge → *Shape Models/Geometric Constraints*
 - Uncertainty of Predictive Models
 - Security of Predictive Models → *Adversarial examples*



Discussed papers:

- **Techniques:**
 - Convolutional Neural Networks (CNN)
 - Recurrent Neural Networks (RNN)
 - Long Short Term Memory (LSTM)
 - Generative Adversarial Networks (GAN)
 - Convolutional AutoEncoders (CAE)
- **Medical Applications:**
 - Lesion Detection
 - Lesion Segmentation
 - Image Parsing/Retrieval
 - Multi-Instance Learning
 - Crowdsourcing



Schedule (tentative)

Date	Session: Topic	Slides	Students
04.02.2019	Preliminary Meeting		
Online	Paper Assignment		
25.04.2019	No Class		
02.05.2019	Presentation Session 1: Supervised Learning (Detection)		
09.05.2019	Presentation Session 2: Supervised Learning (Segmentation)		
16.05.2019	Presentation Session 3: Unsupervised Learning		
23.05.2019	Presentation Session 4: Semi/Weakly/Weakly-Supervised Learning		
06.06.2019	Presentation Session 5: Domain Adaptation / Meta Learning / Uncertainty		
27.06.2019	Tentative		
04.07.2019	Tentative		
18.07.2019	Final Session		



Presentation (60%)

- 20 minutes + 10 minutes Q&A
- slides (Powerpoints, Latex, see website for templates)
- they should cover all relevant aspects of the paper
 - Motivation
 - Methodology
 - Experimental results
 - Take Home Message
 - Discussion
- self-contained (review of state of the art is necessary!)
- **all students are expected to attend all presentations and interact during Q&A**



Report (30%)

- should summarize the paper in **your own words** including one/two figures explaining the methodology
- Summary should include:
 - Purpose
 - Methods
 - Experimental results
 - **Discussion**
- language: English
- max 2 pages
- template on course website (latex) --- lrzgit (shared tex)

Attendance(10%)



Roadmap



Next?

If you are still interested in this practical course, please write a brief motivation paragraph (*few lines*) showing your interest and your background in Machine/Deep Learning, ideally showing your skills in previous ML projects. Send this email, with a subject “**DLMA_Motivation**”, to *Dr. Shadi Albarqouni* (shadi.albarqouni@tum.de). Deadline is **13.02.2019**.

Don't forget to register at TUM matching system

08.02 to 13.02.19: register via matching.in.tum.de

You will be contacted later to send your paper preferences.

