



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



Technische Universität München

Slides by:

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Chair for Computer Aided Medical Procedures & Augmented Reality



Team

Organzier



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Tutors



Magda Paschali

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Ashkan Khakzar

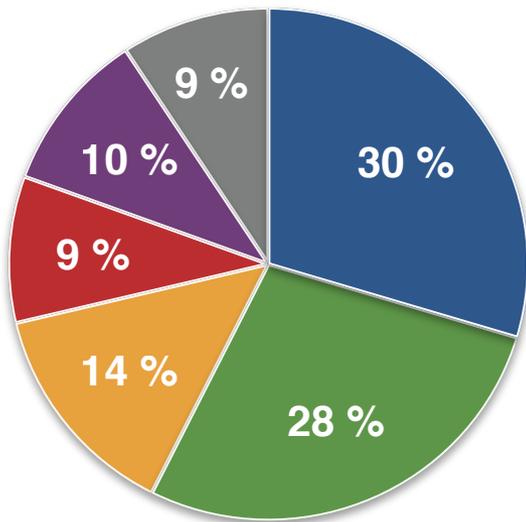
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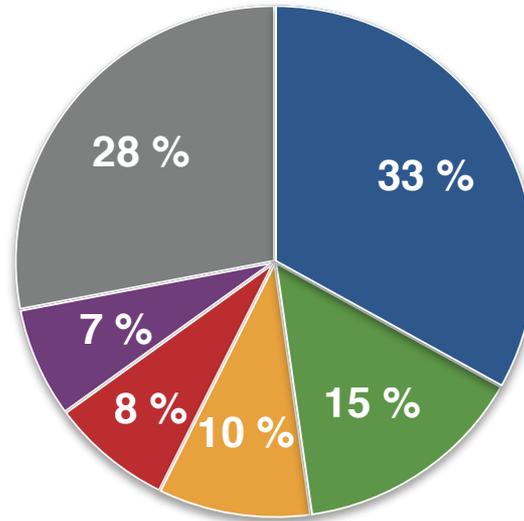
Popularity?

obtained via matching.in.tum.de

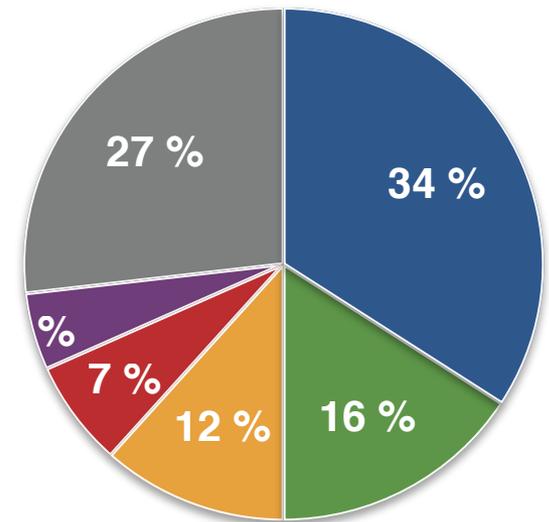
108 Applicants in WS17



157 Applicants in SS18



164 Applicants in SS19



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





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Course Regulations



Technische Universität München

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 → Interpretable ML
 - Handling few amount of labeled data → *Transfer Learning, Semi-/Weakly- Supervised Learning, Meta-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)
 - Fully Convolutional Networks (FCN)
 - 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

Date	Session: Topic	Slides	Students
18.07.2019 (13–14)	Preliminary Meeting	Slides	
Online	Paper Assignment		
24.10.2019	No Class!		
31.10.2019	Intro. to our DLMA Seminar		
07.11.2019	Presentation Session 1: Supervised and Unsupervised Learning		
14.11.2019	Presentation Session 2: Semi/Weakly/Weakly-Supervised Learning		
21.11.2019	Presentation Session 3: Interpretable ML		
28.11.2019	Presentation Session 4: Spatio-Temporal ML		
05.12.2019	Presentation Session 5: Domain Adaption		
12.12.2019	Presentation Session 6: Meta-Learning		
19.12.2019	Presentation Session 7: Uncertainty		



Evaluation

Presentation (45%)

- 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**



Blog Post (45%)

- Blog post explaining the **main ideas of the paper**.
 - Motivation + Contributions (25%)
 - Methodology (50%)
 - Results & Discussion (25%)
- You can refer to <https://bair.berkeley.edu/blog/> to get ideas for how a quality blog post summarising a paper should look like.
- Students will be requested to **comment on each other's blog posts**.
- The website where the posts will be uploaded is [1].
- You can later privately share your blog posts in other websites as well (eg Medium).

Attendance (10%)



[1] <https://wiki.tum.de/pages/>

How can you apply?

- Send us a motivation e-mail with the title “**DLMA_Application**”
- Send the e-mail to: **dlma@mailnavab.informatik.tu-muenchen.de**
- **Template** for e-mail:
 - Name:
 - Master's program:
 - Current Semester:
 - Related courses (if passed, mention the grade):
 - Short Motivation (**Max 3 sentences**. It should include related projects/publications/competitions/github repositories):

Deadline for motivation e-mails: **24.07.2019**



Important Dates

Deadline for motivation e-mails:

24.07.2019

You can find these slides and other info on the course website:

<http://campar.in.tum.de/Chair/TeachingWs19DLMA>

Don't forget to register at TUM matching system

Register via matching.in.tum.de

19.07 to 24.07.2019:

