Questions for Seminar on Bio-Medical Image Analysis

Due 15.07.2016 18:00

Please e-mail your answers for each paper to the corresponding advisor which is stated next to each title.

1 Instance-aware Semantic Segmentation via Multi-task Network Cascades - Özgün Cicek

Question 1 How the authors embed ROI cropping, which binds stage 1 to stage 2, into backpropagation? (≈ 2 sentences)

Question 2 How is the extended multi-task network cascades are trained and tested? (≈ 3 sentences)

Question 3 What are the findings of the paper regarding the shared features and using cascades with more stages in training? (≈ 2 sentences)

2 Recurrent Instance Segmentation - Dominic Mai

Question 1 What are the 3 conceptual parts of the network architecture and what is the purpose of each of them? (3 sentences)

Question 2 When does the network stop to output new segmentation mask predictions? How is it learnt? (2 sentences)

Question 3 How is the assignment between ground truth segmentation masks and predicted segmentation masks found? (1 sentence)
3 Learning to Track at 100 FPS with Deep Regression Networks - Benjamin Ummenhofer

Question 1 Match the keywords and their short descriptions. Give your answer as pairs e.g. B2, C1, ...

A Regression
B Classification
C Overfitting
D Learning rate
E Finetuning
F Laplace distribution

1. Finding a model that adapts to the noise in the training data. This results in bad predictive performance.
2. Problem of estimating relationships between variables.
3. Training a network that uses weights from an already learnt model as a starting point.
4. The step size of an iterative optimization algorithm such as stochastic gradient descent.
5. Problem of identifying the category of an observation.
6. \( \frac{1}{2b} e^{-\frac{|x-\mu|}{b}} \)

Question 2 What is the difference between online and offline training? What is the advantage of the offline approach? (3 sentences)

Question 3 Describe the inputs and outputs of the network.

4 Online Multi-target Tracking using Recurrent Neural Networks - Robert Bensch

Question 1 Briefly summarize the task, including the main characteristics, the presented end-to-end learning approach is to solve. (2-3 sentences)

Question 2 Explain the purpose of each of the two main components within the approach, which are 1) Recurrent neural networks (RNNs) and 2) Long short term memory (LSTM). (2-3 sentences)
5  Real-Time 2D/3D Registration via CNN Regression - Thorsten Falk

Question 1  What kind of data are registered? What is special about that kind of registration?

Question 2  How many CNNs are used? Why is the proposed hierarchy useful according to the authors?

Question 3  What are the outputs of the different networks and what kind of registration is tackled (rigid/elastic)?

6  Inception-v4, Inception-ResNet and the Impact of Residual Connections on Learning - Nima Sedaghat

Question 1  What are residual functions and how are they implemented in a residual network?

Question 2  How does Inception-v4 differ from Inception-v3? (Max 3 sentences)

Question 3  What is the most significant achievement of adding residual connections to the Inception architecture?

7  Bridging the Gaps Between Residual Learning, Recurrent Neural Networks and Visual Cortex - Ahmed Abdulkadir

Question 1  Explain in your own words the equivalence between a ResNet and an RNN. (Hint: Figure 1)

Question 2  What are the general findings regarding the performance with respect to the number of parameters, the number of states, and the readout time?

Question 3  What are transition functions in the context of convolutional RNN and why/when are they needed?
8  Identity Mappings in Deep Residual Networks  
   - Ahmed Abdulkadir

Question 1  Explain in your own words the composition of a residual unit and the basic idea behind it. (Hint: Consider the flow of information.)

Question 2  How do the authors motivate the importance of identity mappings?

Question 3  List the three main variants of $f$ that the authors experimented with. Which one was the best?

9  Dynamic Memory Networks for Visual and Textual Question Answering - Maxim Tatarchenko

Question 1  Name and briefly describe the main building blocks of the original Dynamic Memory Network (not DMN+).

Question 2  What is the difference between the textual input modules in DMN+ and DMN?

Question 3  Which data structure in the visual input module corresponds to sentences in the textual input module?