

# MICCAI 2016 DAILY Athens

GREECE

19<sup>TH</sup> INTERNATIONAL CONFERENCE ON  
MEDICAL IMAGE COMPUTING &  
COMPUTER ASSISTED INTERVENTION

Thursday October 20

Exclusive Interview with Clare Tempany  
Presentations  
Highlights

MICCAI Women Lunch  
Women in Science  
Shadi's Picks

In cooperation with

**Computer Vision News**  
The Magazine of The Algorithm community



## For today, Thursday 20



**Shadi Albarqoun** is a PhD Student at **Chair for Computer Aided Medical Procedure (CAMP)** at **Technical University of Munich (TUM)** in Munich, Germany.

*“I’m Interested in Deep Learning for Medical Application. In particular, combining both Artificial Intelligence (AI) together with the Human Intelligence (HI) through crowdsourcing or active learning. For those who are interested in Deep Learning, fundamentals and practical hands-on, follow our CAMP/TUM page”*

## All posters are in the morning:

10:30 to 12:00

Pages 43-46 of the Program Book

- PS5-8 **Self Super-resolution for Magnetic Resonance Images**
- PS5-19 **Automatic Lymph Node Cluster Segmentation using Holistically-Nested Networks and Structured Optimization in CT Images**
- PS5-23 **Joint Segmentation and CT Synthesis for MRI-only Radiotherapy Treatment Planning**
- PS5-26 **7T-Guided Learning Framework for Improving the Segmentation of 3T MR Images**
- PS5-31 **Crowd-algorithm collaboration for large-scale endoscopic image annotation with confidence**
- PS5-36 **Deep Learning Computed Tomography**



*“It is a great opportunity to have this year MICCAI in Athens, Greece, where you can enjoy the ancient culture together with amazing scenes of nearby islands. I therefore recommend to spend some time in these islands”*



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## MICCAI Daily

Editor: **Ralph Anzarouth**

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Dear Reader,

This is the third and last **MICCAI Daily** for this year.

You will find in it a fascinating interview with **Prof. Clare Tempany**. The lesson she taught me in gracious kindness is not less powerful than all that she discusses at page 4: the relations between industry, academy and medicine, as well as the role of women in the scientific community.

One of those women is **Aïcha BenTayeb**: I am so glad that she accepted my offer to be part of the **Women in Science** section: her positive attitude and her exceptional vitality are an example to follow. Find her energy and talent at page 12.

With a lump in my throat, I conclude this **MICCAI Daily** edition, like I did before with **CVPR Daily** and **ECCV Daily**. I am sincerely grateful to the **nearly 100 participants** who shared their work and their passion with me. I wish you success with all my heart. But diamonds are forever: somebody is already working at [MICCAI 2017 in Canada](#): **Simon Duchesne** tells us more about it at page 22.

MICCAI did me a huge honor, for which I am truly grateful. In particular, I am indebted to **Sebastien Ourselin and his team** for trusting me fully and giving me complete editorial freedom. In the same breath, I wish to congratulate **Mehmet Eldegez, Cagla and all Dekon** for their professionalism.

Now a personal note: I would be delighted to **keep in touch**. At the very least, if you appreciated this MICCAI Daily, please [subscribe to Computer Vision News](#). It is also free and both share the same editor and the same editorial concept. And I would be delighted to know that, once a month, you keep reading the stories that I love to collect for you.

Enjoy the reading!

**Ralph Anzarouth**  
Editor, **Computer Vision News**  
Marketing Manager, **RSIP Vision**





**Ralph Anzarouth:** You have been for a long time already at the key junction of these three areas: academia, medicine, and industry. During these past few days I've been hearing so often the idea of a "bottleneck" in the relations between these three worlds. Everyone says it will improve. What are the problems and what are the domains in which it should improve?

*"It was much easier 20 years ago than it is today for sure"*

**Clare Tempany:** I agree, and it has changed a lot since I began in this career. It's been at least 20 years that I've been doing this kind of research. It was much easier 20 years ago than it is today for sure. 20 years ago, it was simple to have a relationship with someone who was interested in your science, who wanted to fund you, invite you to give a talk, speak to a group, or go to a meeting. All of these things were much more encouraged.

Nowadays, there is this very big sensitivity about confidentiality of data, intellectual property, proprietary rights, and then of course, in the US, the concern of Influencing or changing the doctor because of undue influence. Particularly in the state I live in, Massachusetts, we have a Sunshine Law, by which I cannot go to a reception or a party given by anyone in the industry without declaring, writing, and letting everyone know. Of course, I have to acknowledge the support all the time, which we do. It's become very difficult with strange relationships.

Absolutely, you are correct. This led to this bottleneck in working through agreements, contracts, any form of negotiation with the partners in industry and academia doing research projects together. Both sides now have legal teams who are very careful about the wording of the contracts. The leading problem is which legal team is the dominating one. Usually, they are jockeying a little bit. Then usually a standard is set. The hospital says: *"OK, this is the template we use. This is the agreement"*. Then the industry eventually says yes if they are motivated enough.

A lot of the time the problem with the bottleneck is that it causes people to question the motivation. Do I really want to do this or do I not? They say, *"Is it worth this effort or this fight?"* So then they sort of say, *"No, it's not worth it. I'll go somewhere else"*.

**Ralph:** What are the criteria to decide if something is worth it or not? Is it money?

**Clare:** It is everything. Does the

science make enough sense? Is the inspiration and the passion there that two teams want to work together enough? This is the part, I find, in my position, that I can help my junior investigators by taking the administration of this piece away and help. Luckily, we have very good administration at our hospital. We try to make this happen quicker. We push, push, push. We try to make sure we are up to date with the laws at our hospital and the laws of the industry. We encourage the relationships and try to find a way for the groups to meet without being afraid.

Particularly for young investigators, they are so worried about being accused of being found to be guilty or something crazy like this. They are very sensitive, and they will not do anything. They are afraid.

***"I think people are still very passionate"***

**Ralph:** Do you think people today are less passionate than they were 20 years ago?

**Clare:** No, I don't think so. I think people are still very passionate. If you know how to get things done, it will get done. The junior people are more afraid, or the path is not clear.

In the past, when there were less rules, it was easier. I could call and talk to people from various companies. I don't remember it being difficult to negotiate my very first research grant. It was my first time ever, and it was not scary.

So I know that it's very intimidating

for people. And risky... but they shouldn't think this way. They should just simply learn the rules and get on with it. You have to work within the framework that the hospitals, institutions, and universities have put in place. Most of the time, they are not there to stop people.

**Ralph:** There is another thing that I have heard a lot these days which is that *"we don't have a data set"*. How to make clinical tests or to make sure that the model works, if there is a shortage of data to validate research which is fundamental to save lives, to improve the lives of people, and to avoid life threatening situations. How can it be that we have such a bottleneck in such a sensitive area?

**Clare:** It's a very good question and a very good point that you are asking. The data is available. Well, some data is available through open source platforms and through the NIH which demands that every form of research has some sort of data sharing source to the public good.

The problem, for some of the folks at this meeting, is that the data is not clean enough. The data is not perfect. I do clinical imaging. We, in the imaging community, I know we do not make clean data. Every patient is a little different than the last patient. The scanning techniques are not the same. Across the vendors, GE, Siemens, Philips, Hitachi, Toshiba, everyone who makes imaging systems, there are differences. Of course, there has to be a difference to differentiate vendors. But this doesn't help the

research community, because the acquisition of the brain imaging for one is not the same as the other. They can only use GE data, or they can only use Siemens data. It's hard. You can get it, but it's usually at a low level.

You'll hear Prof. Kamil Ugurbil, on Thursday, speak about how they got the companies to do standardized work for Human Connectome Project and then even before that the ADNI project. It's definitely possible. The ADNI data for example, is now available for everybody. There's a lot of brain imaging data available.

There are at least 3 major international trials right now on brain imaging and body imaging, all of which promise to have globally available data. I think the community has heard this complaint, and the community is responding. It takes a long time to collect this kind of data.

***"About a scientist, a PhD, or even an MD. If you want to be in medical imaging, you have to start in the hospital"***

One quick solution is that everyone who complains about this should go and find a local radiologist at their hospital or the chief of the radiology department and talk to them. The chairmen of the radiology department are very motivated to have their data meet the standards. They want it to be the same. I think theirs is an alignment of motivation.

**Ralph:** If you had to advise a young, aspiring scientist, would you tell

them to go to academia, industry, or medical practice?

**Clare:** Well, the career choices are difficult. I think the better question is the first part of your question. About a scientist, a PhD, or even an MD. If you want to be in medical imaging, you have to start in the hospital. You have to start near the clinic. You have to understand how healthcare is delivered, what are the constraints, what are the workflow problems, then you can solve them. If you don't know what the problems are, how can you solve them? It's a little bit like the hammer and the nail. You know, do we have a hammer or do we have a nail? Maybe you need both.

Then, if the academic environment doesn't support them, it's very challenging to get full support like money for a salary and to raise a family. It's very difficult. Then the industry is a very good place. Industry can be a little constraining. You have to pick the right industry that allows you the freedom to be able to grow a lab, have a mentor, and do the good research.

I am biased because I want good scientists in the hospital. I want them to stay with me, but I understand when they leave and they go to good companies.

**Ralph:** If you were 20 years old today, with the market conditions of today and with the scientific knowledge available, would you go into medical practice or would you do something different?

**Clare:** That's a very good question. I



think medical practice is incredibly rewarding. I'm a radiologist so I don't take care of patients. I make diagnosis. I'm sort of like the doctor's doctor. They come with the problem and I help them solve it. I love this challenge. I love the challenge of taking the data and looking at the images and finding the finding. It's very satisfying.

I've been very lucky to work in clinical and now in research as well. I think I have had a very good balance. I think, this will be much harder in the future because clinical practice of medicine is so demanding that it wants 100% commitment with very little time for research. I think this is a tragedy.

If it was today, I think it would be better off to do the medical degree, spend one or two years in the hospital, and then go work in a really good industry where I can make a big difference. You can make a bigger difference perhaps in industry today than you can in healthcare. Now it's hard. It's really hard to be a good doctor and do really good science at the same time. It's very difficult.

**Ralph:** In my magazine, Computer Vision News, and also in the Dailies that I have published at CVPR, ECCV and now at MICCAI, there is a section dedicated to Women in Science. Every issue, I interview a woman, and I ask her about her career.

**Clare:** On behalf of the women, thank you... and their husbands, and their partners, and their sons... thank you.



**Ralph:** *[blushes and smiles]* Very often I hear women speaking about the importance of confidence or lack thereof. They say if they had more confidence, they would succeed like a man. Given your experience, why do you think men seem to have more confidence in this field than women?

**Clare:** Well, this is gender biology. Gender biology is really driving those two answers. Remember back in the beginning when we all started. The man was the hunter. He had to go out and find the food for the family because he was stronger. The women stay at home to nurture the children because they are the only ones that can get pregnant and have babies. It goes way back. This is engrained in our DNA. The women are the team builders, the family, the protectors, and the homemaker. The man goes out, he hunts, he brings back the animal, and he feeds his family.

Usually, it's still somewhat the same even today. We are trying very hard to change this of course. We have to create more and more opportunities

for both men and women in the same environment.

***“All my life, I had to be better than the man next door, the man in the office, or the man who was competing”***

All my life, everything that I have done, to succeed, I had to be better than the man next door, the man in the office, or the man who was competing. You always had to be better. This was beaten into me. I come from a medical family in Ireland. In medical school, it was always that the women must be better. It's crazy. You can't be just as good. You have to be better.

**Ralph:** But why this lack of confidence in so many young, female scientists? You are at a point in your career where you should feel confident with all of your successes. What can we do to help these ladies feel more confident in what they do?

**Clare:** Well, it's mentoring and opportunities. With mentoring, they need to find someone in the institution or the industry where they're working. It doesn't have to be a woman, but it has to be an open minded person who will tell them the truth, the good things and the bad things they are doing, and steer them.

The opportunities: the opportunities to speak, to publish, to go to meetings, things like that. This is not always obvious. Men always put their hand up and say they'll go. Women think, oh, I have a baby at home, I have to do this, my husband

might be away. There are a lot more considerations, and they are less egocentric than the man sometimes.

So I think it's opportunities and mentoring that are very, very important for women. The sisterhood and supporting each other is important. I think it's also recognition by men. Every time I'm asked to suggest a name for something, I say to myself, ok think of one man and think of one woman. I make myself decide to pick a man and a woman always. I very rarely suggest men or women only. It's conscious effort because I have to make myself do this. Instinctively sometimes I just say the man's name.

You have to be the type-2 decision making that I was talking about in my slide. You have to think rationally, strategically, ask for advice, and it's harder. Most people, when they are asked to quickly name who should go? Who should do this? You think, the guy I like best: I had a beer with him last night or I play golf with him or he likes the Red Sox. He shares my football or my passion in sports. This kind of thing.

Another very silly thing, but it's a tip for the women is to learn about the football or sport in the country that they are in. There's a book called hardball for women, and it's all about learning about baseball. I went to America, and I didn't know anything about American sports. I didn't like football or ice hockey, but baseball seemed like cricket because I'm from Ireland. In England, they play a lot of cricket. I like baseball. I



went to the baseball games. Slowly, I started learning a lot about baseball. Now, when I go to any meeting, anytime, and they're talking about baseball, I immediately join the conversation and talk about it. It's silly, completely silly. Then they say, oh she likes the Red Sox. We make jokes about the teams or we fight about the teams.

**Ralph:** So you're one of the guys?

**Clare:** Yes, a little bit. Seriously, find something like this that the men always talk about at work. Often it's sports. Even if you don't know what the sport is about, in your town, in your city, learn about the local ones. Sometimes women try too hard to talk about work, and nobody wants to talk about work all of the time. Have something neutral and safe. Not just the weather, and certainly not politics because it's too crazy.

**Ralph:** One of the things I hear in my interviews is that they feel uncomfortable when they are the only woman in a meeting.

**Clare:** Yes, of course, but they have to get over that. It still happens to me today. I am still the only woman sometimes, but you have to forget this and be confident.

**Ralph:** When I am the only man in a meeting with all women, I feel very comfortable.

**Clare:** When you are comfortable in your own skin, you are happy talking to anyone. I can tell from your personality. That's nice, and you like people.

The world is a very scary place sometimes, and we have problems

with general xenophobia or not liking people who are different. At the moment, it's very frightening. We have to compensate for that.

A person is a person. I think just be polite and friendly. Just like when you met me in the elevator. I didn't know who you were, but you had a big smile so I said hello, and we started talking. Smile!

My son is taking a course right now, on the Science of Happiness. They're teaching him, and it sounds crazy, but a lot of it is just about smiling. The smile is the first thing that people see on your face. Not whether you are beautiful or handsome or you are well-dressed, it's your smile. They said it's very important to smile as much as possible. Then people are more likely to say hello to you.

**Ralph:** I think that if I want to make people happier, I smile at them and they will feel more comfortable.

**Clare:** Sure, and then people drop their guard a little bit.

**Ralph:** They will like it actually: there is no reason to feel under pressure because a stranger is in your elevator. I smile in the same way to someone who is very well known in the industry and to someone who is coming to MICCAI for the first time.

**Clare:** That's a great way to be, but a lot of people are not like this. They're shy, and shyness is a real problem, especially in computer science. The computer nerds are more used to screens than to people. You have to learn a little bit to come out of your shell, if you're going to succeed in this kind of business.

## Florian Dubost

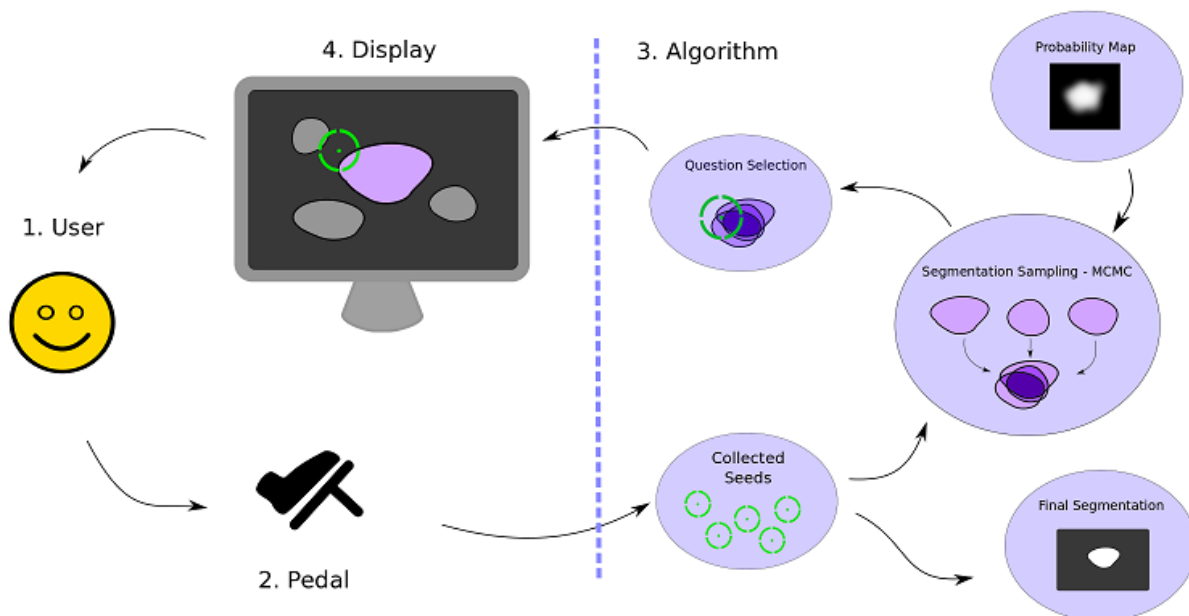
### Hands-Free Segmentation Of Medical Volumes Via Binary Inputs



**Florian Dubost** is a PhD student at the **Erasmus Medical Center, Rotterdam**. This Friday afternoon he will present his work at the **LABELS** workshop.

***"For a quick and efficient exploration, these segmentations are sampled according to the Metropolis-Hastings algorithm"***

Florian proposes a novel hands-free method to interactively segment 3D medical volumes. In his scenario, a human user progressively segments an organ by answering a series of questions of the form *"Is this voxel inside the object to segment?"*. At each iteration, the chosen question is defined as the one halving a set of candidate segmentations given the answered questions. For a quick and efficient exploration, these segmentations are sampled according to the Metropolis-Hastings algorithm. His sampling technique relies on a combination of relaxed shape prior, learnt probability map and consistency with previous answers. He demonstrates the potential of his strategy on a prostate segmentation MRI dataset. Through the study of failure cases with synthetic examples, he demonstrate the adaptation potential of his method. He also shows that his method outperforms two intuitive baselines: one based on random questions, the other one being the thresholded probability map. Visit his poster on Friday at 17:15 at LABELS.



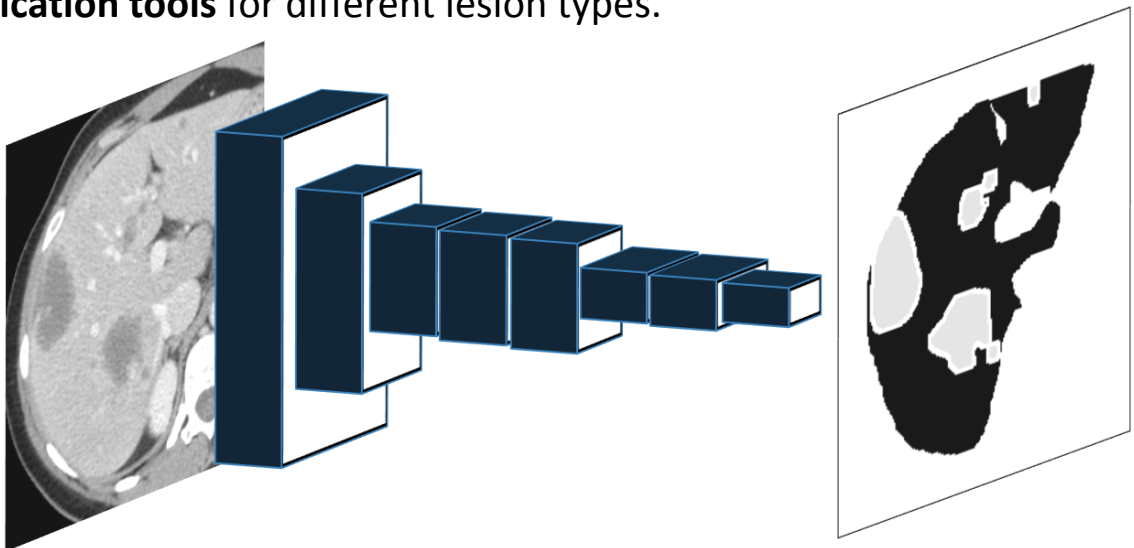
## Fully Convolutional Network for Liver Segmentation and Lesions Detection



This Friday, **MICCAI 2016** will host workshops that will be held after the publication of our last **MICCAI Daily**. Among them, **DLMIA 2016**: the 2nd Workshop on **Deep Learning in Medical Image Analysis**. We have asked **Avi Ben Cohen**, one of the poster presenters at the morning session, to tell us about the work he is presenting with his colleagues (**Idit Diamant, Eyal Klang, Michal Amitai and Hayit Greenspan**). The project is a part of a joint effort of the **Medical Image Processing lab in Tel Aviv University** (headed by Prof. Hayit Greenspan) and the **Sheba Medical Center**.

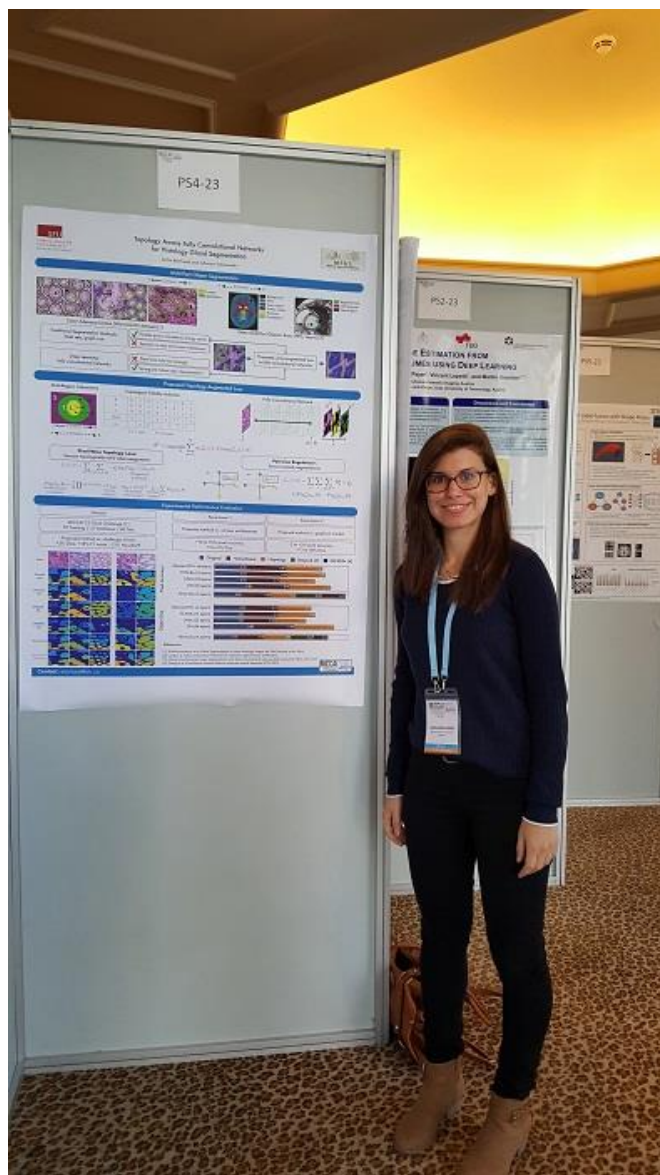
*“A package of tools necessary for radiologists going over a liver CT examination”*

This project presents an automatic system for **liver segmentation and lesions detection in CT examinations using fully convolutional neural network architecture**. Currently this task is manually handled by radiologists and can be very time consuming. In addition, the variability in texture, size and different contrast enhancement behavior of liver lesions and parenchyma make it in many cases a difficult task. One of the difficulties comes from **detecting small liver lesions**: the model explores different scales of the fully convolutional architecture for that purpose and although in some cases this was helpful, in other cases small lesion can be missed, meaning that more improvements and work needs to be done. This project is a part of an ongoing project for creating a package of tools which is necessary for **radiologists**, when they go over a liver CT examination. These tools include the **liver segmentation, lesion detection and segmentation, follow-up tools** for treatment evaluation and **classification tools** for different lesion types.





## Aïcha BenTayeb



**MICCAI Daily:** Where do you study, Aïcha?

**Aïcha BenTayeb:** I am a 4<sup>th</sup> year PhD student at the medical image analysis lab of the Simon Fraser University in Vancouver, Canada.

**MICCAI Daily:** You are not really Canadian...

**Aïcha:** No, I am Tunisian. I was born there and did my studies in France, in Paris. I did my master's degree there, specializing first in biomedical

engineering, which was a passion for me back then. Then I decided to start a PhD, when I met my current supervisor and moved to Vancouver.

**MICCAI Daily:** How did you discover your passion for science?

**Aïcha:** When I was a kid I wanted to be a doctor and to be part of the medical profession. I had a teddy bear and used to practice tracheostomy on it: open the throat of my teddy bear and put a straw in it *[laughs]*, to save it from cardiac arrest.

**MICCAI Daily:** He certainly needed it. Actually, you saved its life.

**Aïcha:** I probably did, but then I killed it back and did it again. I always wanted to get into medical school, but after high school I went to Prépa (French preparatory school) and I wasn't sure anymore if I really wanted to be a doctor or to be in the research side of medicine. Prépa was a good way to figure that out and see where this would lead me.

That's when I got introduced to engineering, basically biomedical engineering: I started my engineering school and they had this program for biosciences.

**MICCAI Daily:** Did you feel that school was the right choice for you?

**Aïcha:** I wasn't sure by then. I only knew that I liked solving problems and learning about problems that I could actually solve. I guess I just

wanted to see how it was, *[laughs again]*

**MICCAI Daily:** Was that the right setting for you to get to know better, and delay for later the decision about what you wanted to do?

**Aïcha:** I think so, because the nice thing with biomedical engineering is that you get to see both worlds: you get to see the engineering part and the medical part as well.

**MICCAI Daily:** Did you feel fit?

**Aïcha:** No, I didn't. I felt that basically I did not know enough to solve those problems. I wanted to know more, discover more challenges and see how I could help. That's when I got my first internship at Siemens

**MICCAI Daily:** How did you get it?

**Aïcha:** I applied! *[laughs]* I had had a couple of internships before and I

think this helps a lot.

**MICCAI Daily:** Why did you choose an internship in the industry?

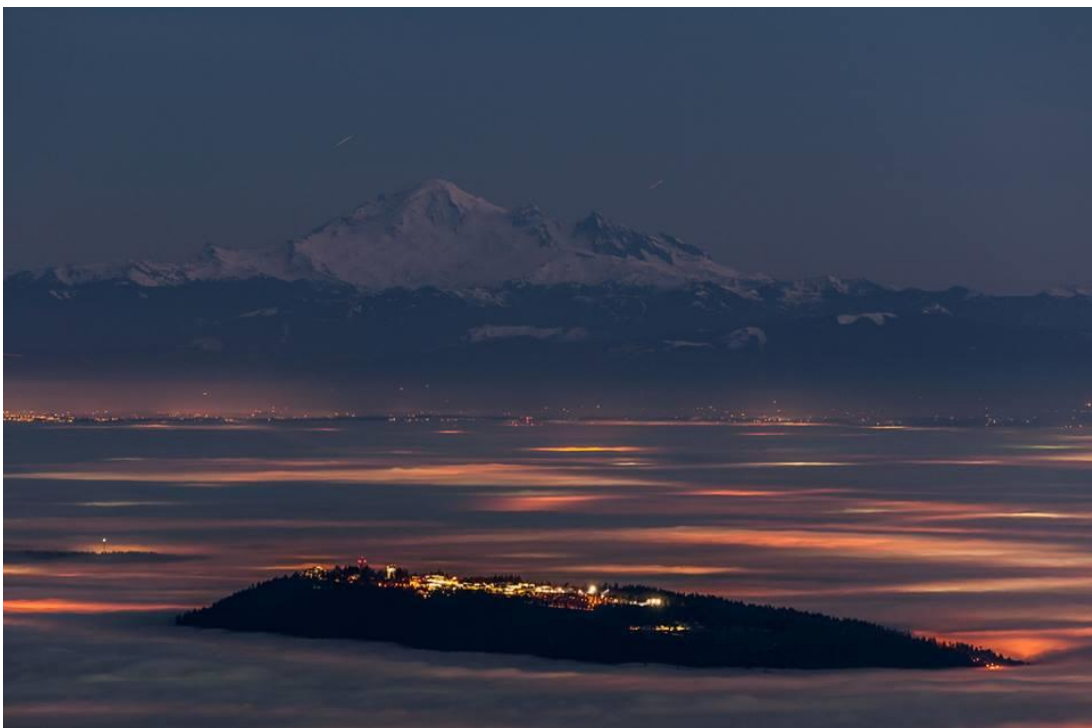
**Aïcha:** I had already done an internship in a lab. So in this way I was seeing both domains.

**MICCAI Daily:** How did you feel in each of them?

**Aïcha:** The lab is more research-oriented and you are free to explore the problems you want. In the industry I was given a problem and also a methodology to solve it. So I had to figure out how that methodology could get combined in a certain way to solve the problem efficiently. I liked this applied activity better.

**MICCAI Daily:** What happens when you do not solve the problem?

**Aïcha:** That happens also during a PhD, what happens when it doesn't work? That's the whole point.





**MICCAI Daily:** How do you handle it?

**Aïcha:** You keep pushing [*laughs again*]

**MICCAI Daily:** Where do you find the drive to keep going?

**Aïcha:** I had the chance to be surrounded by very clever people, both at Siemens and during my PhD. That really helped me out to get a sense of how research should be done. You set back, try to understand what's wrong and redefine the things.

**MICCAI Daily:** Did you meet only with short-term failures?

**Aïcha:** No [*laughs*], I had long-term failures too! I thought the idea would work, but somehow it never reached the point of success.

**MICCAI Daily:** Did you ever feel like giving up?

**Aïcha:** During PhD, many times [*laughs*]. So often you feel down because whatever you come up with, you are stuck. It's not working at all, but one day you get that idea, that illumination of your day, and you think why didn't that come to you before...

**MICCAI Daily:** Giving up was only a temptation or there was a real possibility you would?

**Aïcha:** No, because I am kind of stubborn in that sense. I would feel too much of a failure if I did, at a personal level. Even if I think that it is not a failure to realize that something is not for you, in my case the power that drives me is the fact that I just can't give up.

**MICCAI Daily:** What if you discovered that this is not what you want?





**Aïcha:** That's another lesson from PhD: it's not about the end-result, it's really about the journey. Because most of the time, you struggle so much to make something working, that at the end, when you get something positive, it's a slight accomplishment. And you feel proud of that, of growing up. But it is an extremely hard path. You have to keep going.

**MICCAI Daily:** Did you see colleagues of yours giving up?

**Aïcha:** Yes, I have met with people who gave up, during the PhD. They realized that they weren't driven by the problem.

**MICCAI Daily:** Males or females?

**Aïcha:** I have seen females.

**MICCAI Daily:** Is your stubbornness a social one, by which you do not want to admit a failure in front of others, or a personal one, towards yourself?

**Aïcha:** I am stubborn in so many things in life... *[laughs]* I think I am stubborn for myself: even when I do not understand something, I just keep going until I really get it. While people who gave up did the right choice, evaluating that this is not good for them.

**MICCAI Daily:** Are you never scared?

**Aïcha:** Of course I am scared. But being scared means that there is a challenge and that you are learning a lot. Scare should motivate you more than disable you.

**MICCAI Daily:** Were your challenges mostly caused by people or by technology?

**Aïcha:** I think that even though a PhD is a mostly lonely path, struggling with your own self to try to understand the emotional state you are in, the answer to crisis is professionalism, as my supervisor taught me: step back and rationalize whatever crisis you are at.

**MICCAI Daily:** Where did you learn those shaking off skills?

**Aïcha:** *[laughs]* That's a funny question, this applies to science and to many other things. You have to step back and look at the situation from a different point of view and it dedrammatizes the situation

**MICCAI Daily:** Have you ever been treated inappropriately as a woman?

**Aïcha:** I haven't felt much discomfort, but it can be very intimidating to be the single girl in a room or to have very few women around.

**MICCAI Daily:** If I am alone in a room full of women, I call it heaven... *[we both laugh]* here is an asymmetry.

**Aïcha:** Let me tell you: I have never been in situations where I felt discriminated because of my gender; and if I am aggressed, I know how to handle that. I can respond.

**MICCAI Daily:** If you had a daughter or a little sister less strong than you are, how comfortable would you be in putting them in the same settings that you've been in?

**Aïcha:** If it was my daughter, I think I'd like her to be confronted to that, because that's how she's gonna learn to deal with that kind of situations.

I do not think that protecting someone and hiding her is the way to deal with this. I want her to learn how to deal with this by herself, which is what happened with me: the first time it happens to you, you do not know how to react, and then you have a spontaneous reaction. Even if she's shy, she has to build that capability

**MICCAI Daily:** Did you ever feel competition and hostility between women?

**Aïcha:** Yes. It funny because Academia is a competitive setting by itself. Everybody is competitive in a lab and people tend to compare themselves to others. So women can be hostile one to another in certain situations, but it is not an issue of gender inequality. Women can be competitive one towards another just like men are.

**MICCAI Daily:** So this is a point which is symmetric.

**Aïcha:** I think everything should be symmetric! This is my point. We shouldn't analyze women and analyze men, we should be just equal.

**MICCAI Daily:** Please tell me something about your work.

**Aïcha:** OK. This year at MICCAI I am presenting my work on a topology aware deep learning model for multi part object segmentation. For many years now, lots of research has focused on energy-based models and a lot of advances were made on designing and adding priors to these

models to better describe objects to segment. However these traditional techniques generally rely on strong data terms which are often sensitive to image appearance.

Recently, there has been a turn in the field with many successful applications of deep learning to various medical applications. Despite their success, existing deep learning models do not specifically encode higher order priors such as objects' topology. Our work attempts to combine the best of both approaches: traditional techniques and deep learning models; and we proposed to augment the loss in convolutional networks with topology priors such as smoothness; containment and exclusion.

**MICCAI Daily:** What are your dreams?

**Aïcha:** I am passionate by the medical field and I want to use my skills to help in that sense. I would like to use what I learn in a more applied system, where I can really see doctors using what I am doing. My dream would be to show to doctors, one day, a tool that I have invented or helped creating - and see them using it, helping people with that. That would be a real achievement.

**MICCAI Daily:** You're a dreamer...

**Aïcha:** In that sense, yes [*laughs*]

**MICCAI Daily:** And a passionate.

**Aïcha:** Yes, I think yes [*laughs again*]

by **Gozde Unal**

## MICCAI Women Networking Lunch - Wednesday

I was happy that many women attending the event stepped up to share their honest opinion about the **Women in MICCAI** Initiative.

It was good to hear the diverse set of ideas and sentiments running in the female members of the community.

Although no consensus is reached at the end of the meeting -which was not our goal by the way, rather it was to hear all- one common idea was to collect data/statistics to see where quantitatively we are in terms of representation of women in MICCAI. This is natural as we are a community of scientists.

Unfortunately, the time was too short, surely the meeting could have continued for a couple of more hours otherwise. So, we plan to set up an online platform as to continue the discussions, have polls/surveys (some could be anonymous) of pressing issues plus to share experiences.

My opinion is that we should keep talking openly about implicit bias, which most of us in the society carry (even us scientists) and raise awareness about it.

I want to end by announcing that **Women in MICCAI committee** is officially created. The liaison is Josien Plum from the **MICCAI board**. We'd like to reach out to all the community for the effort to increase the number of women in our field. For all kinds of comments, feedback

and input, please feel free to reach us: me (**Gozde Unal**) and **Ipek Oguz, Tal Arbel**, Parvin Mousavi.



All images courtesy of **Prof. Leo Joskowicz** of the Hebrew University of Jerusalem



## Mahsa Shakeri

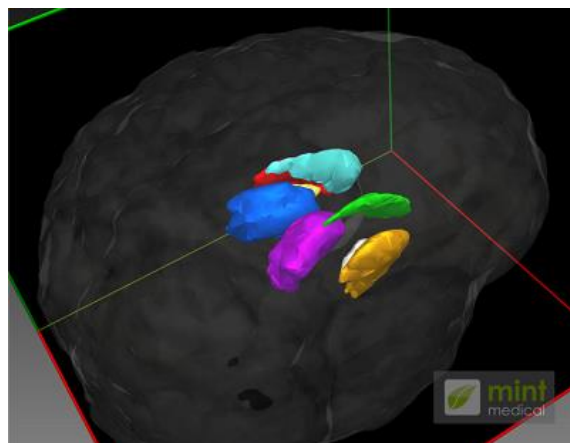
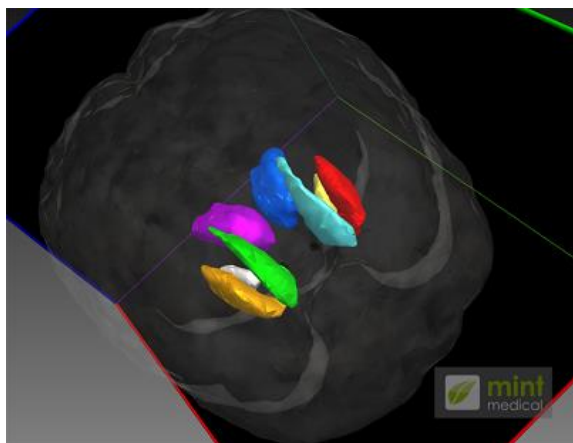
## Enzo Ferrante

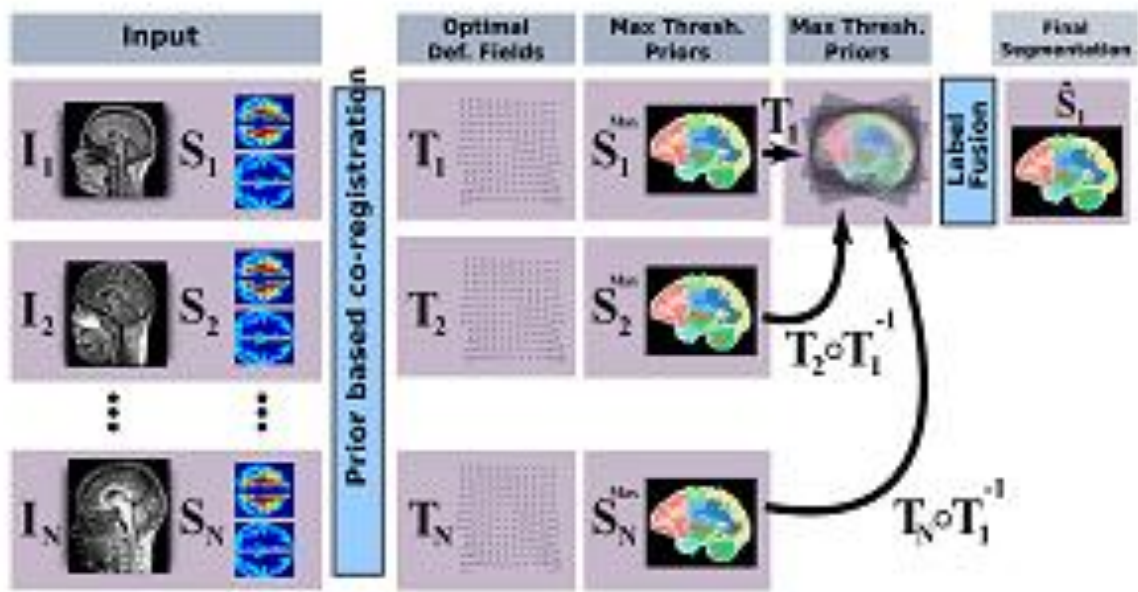
### Prior-based Coregistration and Cosegmentation



I met Mahsa and Enzo during MICCAI, and they told me about their stories and work. Mahsa Shakeri is an Iranian PhD student, who is currently finishing her PhD at Polytechnique Montreal in Canada. Enzo Ferrante is Argentinian, and he is a postdoctoral research associate at the Biomedical Image Analysis group of Imperial College London. He is also finishing a master on sociology of science. They met a year ago in Paris at the Center for Visual Computing (CVC) of CentraleSupélec, where they started a project that was published this year in MICCAI.

Their work is a nice example of how collaboration works in the scientific world. On the one hand, Mahsa had experience on brain image segmentation techniques, and during the last year she was particularly interested in multi-atlas segmentation. On the other hand, Enzo had been working during the last 4 years in the domains of probabilistic graphical models and discrete optimization, focusing on medical image registration.





*“Mahsa had experience on brain image segmentation techniques, and during the last year she was particularly interested in multi-atlas segmentation”*

The paper they are presenting at MICCAI on Thursday (see their poster PS5-21 from 10:30-12:00) is about a co-registration and segmentation framework that combines ideas from these fields towards producing automatic annotations of sub-cortical structures in brain MR images. These annotations are of great importance for diagnosis and characterization of different neurodegenerative and neuropsychiatric disorders, including schizophrenia, Alzheimer's disease, attention deficit, and sub-types of epilepsy.

What I found most interesting about their method in comparison with previous multi-atlas segmentation approaches, is that instead of using expert manual annotations (which are difficult to obtain and highly time-consuming), they showed that it is possible to use semantic priors learned with any machine learning technique to guide both, groupwise registration and segmentation processes. For that, they contacted Stavros Tsogkas, a deep learning and computer vision researcher currently working at University of Toronto, to design a convolutional neural network architecture that was finally used to produce the semantic priors.

Their work was not only a nice example of science collaboration, but it also produced really promising results which may lead to future better understanding of structural alterations related to different brain disorders.

## Mattia Gentil

### Interactive Tracking of Cells in Microscopy Image Sequences

During Monday's workshop about Interactive Medical Image Computing (IMIC), **Mattia Gentil** gave a talk about his paper "Interactive Tracking of Cells in Microscopy Image Sequences".

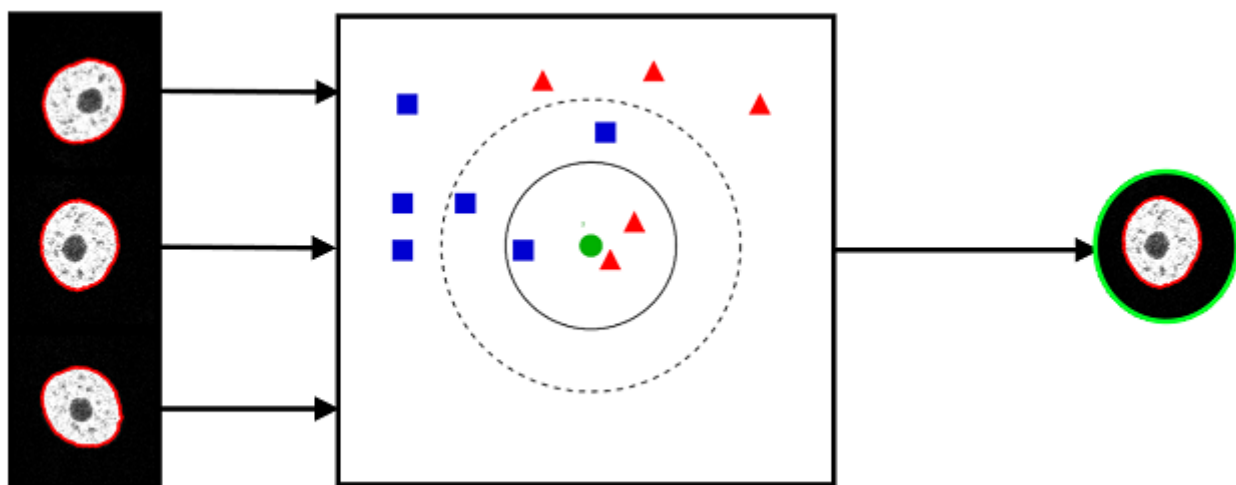
This work has the goal of providing a reliable tool for live cell tracking in microscopy videos with the supervision of a domain expert.

The proposed approach relies on level set segmentation algorithms to keep track of the boundary of each cell in every frame of the video; this is necessary in order to extract useful metrics for medical analysis (e.g. the measure of the surface of a cell or its movement over the substrate).

However automated algorithms make mistakes, therefore an expert is asked to oversee the tracking process and he is given the tools to stop the tracking and manually correct the mistaken cell boundaries.

Furthermore the research group also proved that a K-Nearest Neighbors classifier can be trained in order to predict when the expert intervention is necessary.

For future work, the team plans on involving inexpensive crowd workers with the purpose of fixing the algorithm mistakes without the expert intervention.





As expected, the [Interactive Medical Image Computing \(IMIC\)](#) workshop held on Monday was very successful. The IMIC is co-organized for the third year now by Steve Piper, Bjoern Menze, Yi Gao, Tina Kapur & Tammy Riklin Raviv. We assisted at three great talks by our planners speakers: **Dr. Tina Kapur**, **Prof. Sandy Wells** both of **Harvard Medical School** and [Prof. Leo Jaskowicz](#) of the [Hebrew University of Jerusalem](#).

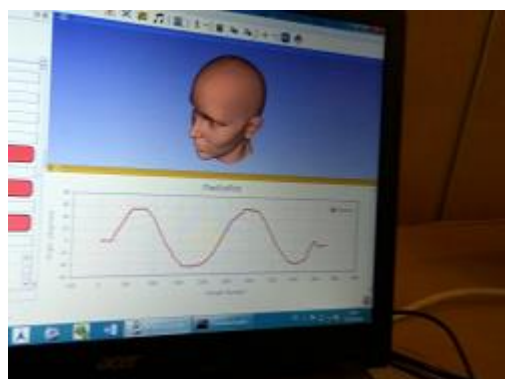
Some notes about the IMIC in general:

Interactive systems are widely used in research and clinical practice, yet most scientific venues make it impossible to fully communicate exactly how they work. IMIC combines live demos, hands-on examples, and scientific publications to support exchange of

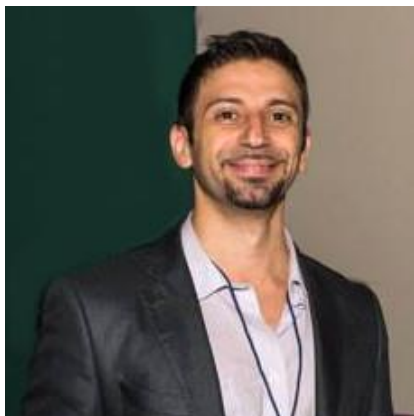
ideas among a community of like-minded researchers. IMIC seeks to showcase and disseminate the best examples of dynamic interaction with medical imagery.

What is special about the IMIC?

The organizers replaced the traditional poster sessions with live demo sessions in which the presenters are presenting their work using their laptops (and sometimes other facilities) while allowing their peers a hands-on experience (see below images). This year IMIC used an online voting system to allow the workshop attendees themselves to chose the best demo prize winner. The prize was deservedly awarded to **Simon Drouin**, a PhD student in the group of **Prof. Louis Collins of McGill University** for his excellent demo and paper.



## Alessandro Crimi



### Effective Brain Connectivity Through a Constrained Autoregressive Model

*“Help studying underlying process of the brain, or be used in intra-operative settings for tumor, stroke and other types of lesions during surgery”*

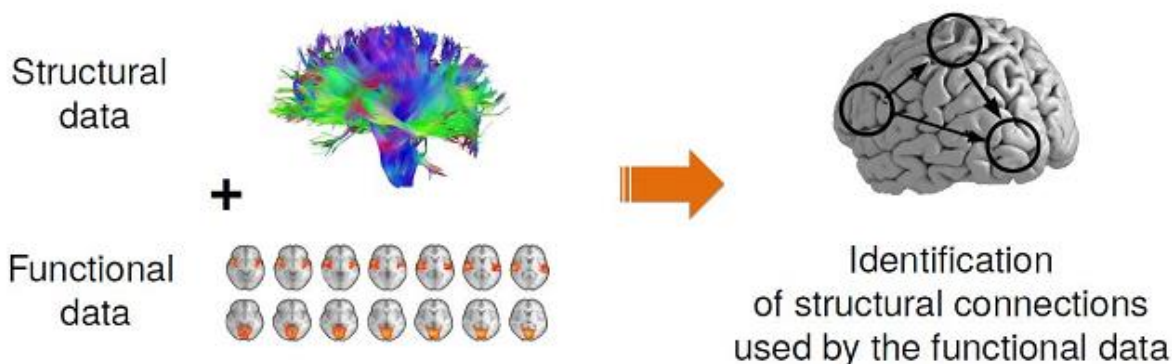
Alessandro Crimi presented his poster and told us about his work. He works on structural and functional connectomes, which is the network of connections in the brain.

The novelty of his work is that he is particularly interested in merging the two modalities. Merging the structural and functional information, trying to reach the holy of effective connectivity. This is important because structural connectomes shows all the brain connections but not the causality and what is really used by the brain, and functional connections shows only the correlation of brain areas which are activated at the same time by a task or fundamental cognitive activity.

With effective connectivity we can see the structural connections which are really used. He solved this issues by combining the two modalities.

The benefit of this approach is that it can help to study underlying process of the brain, or be used in intra-operative settings for tumor, stroke and other types of lesions during surgery.

Besides, Alessandro - together with other colleagues as **Prof. Menze**, **Prof. Handels**, **Prof. Reyes**, **Oskar Meier** and **Stefan Winzeck** - organized the [BrainLes MICCAI workshop](#), held the day before the main conference. The event includes segmentation challenges, keynote talks and more about brain tumor, multiple sclerosis and stroke. This was the second edition and they look forward for suggestions for [the third edition of BrainLes next year](#).



**MICCAI Daily:** I'm at the Springer booth with **Wayne Wheeler**, who is **Senior Editor for Computer Science at Springer London**. I see you display your catalogue in many scientific conferences. Why do you come and propose your books here, and what kind of books are they?

**Springer:** Two main reasons: Basically, Springer is the number one world publisher in proceedings of scientific conferences of all sciences. MICCAI, of course, has been one of our core audiences for many years. We publish the proceedings for MICCAI so we always want to be here to support the MICCAI communities. We like to showcase our journals, our books, our proceedings, and all of our products to let the community know that we support them in whatever

publications they have or ideas that they might have and to answer questions. We come here to meet face to face and support them.

**MICCAI Daily:** Is there still a place for paper in this kind of business?

**Springer:** Absolutely - Thank you for the question. Books actually are surging again. We're finding data to support that. Whereas, under the electronic revolution, books started to decline, they are starting to come back up, especially textbooks because students don't prefer looking at and studying online. They prefer paper. We're increasingly publishing only in electronic for journals. Although journals are more preferred in electronic form, regarding books, many people like to hold them in their hands.

**MICCAI Daily:** You have certainly met a lot of young people and students around different conferences. What makes MICCAI special and what particularly charms you with the people that you meet here?

**Springer:** [laughs] This is a tricky question, but one thing that I really appreciate about the MICCAI crowd is that it is very international. Some conferences that I attend are really focused on one or two major markets or major regions of the world. MICCAI is very international. There's a great dynamic and mixture of people from academia and industry, and a great mixture of age groups. We get to meet and support young talent and also nurture long standing relationships.





## Simon Duchesne - General Chair

**Ralph Anzarouth:** How do you like this conference? What did you learn from it that you will bring to [MICCAI 2017](#)?

**Simon Duchesne:** First of all, my first MICCAI was in 2000. I missed just a few so this is probably my fourteenth or fifteenth MICCAI. I've seen it evolve throughout the years. Each year is slightly different from the last. They each have their own flavor. This depends on what papers are being proposed, and the scientific content changes from time to time.

Of course, the location and organizing gives it a different twist. From the organization point of view, the first twist here was the change from Istanbul to Athens. I feel the pain of Sebastian and the rest of the crew because I know fully what kind of work it is logistically to have 6 months to move from one city to another. When you actually organize a conference and have to deal with contracts, logistics, hotels, and all of those details, there's a lot of work.

**Ralph:** What about the technical program? What did you learn as a lesson to take with you next year?

**Simon:** There are certainly new trends. One of the biggest new trends that everyone is talking about is machine learning in general, deep learning in particular. That is certainly a trend that is here, probably to stay. We've seen trends come and go at MICCAI, but I think machine learning has been here for

a while and will be here. Deep learning is one of the great applications mainly because it has a lot of results. This is certainly a trend that we will favor for next year.

**Ralph:** Are there novelties that you can tell us that will happen next year in Quebec?

**Simon:** There will be novelties in terms of scientific content. It's hard to know. Of course, it depends. What we can only hope is to have more people. There has been a slight decline in terms of the number of people that came this year compared to last year. That is likely because of the change in venue. We hope to go back to a steady number above 1,000 people. This, of course, brings more papers and more science. Other big things in Quebec City: First of all, we would like to make it a really welcoming environment for everybody. I think Quebec City is a wonderful city for that. The convention center is right in the heart of things. Everything will be walkable. It's a safe and secure city. Of course, I might be slightly biased, but I think it's beautiful. There is a lot of talk in the women community, and that's certainly an aspect that we would like to push.

**Ralph:** Why do you take on yourself the burden of organizing MICCAI?

**Simon:** I've been doing events since 2003. I've been quite involved. This is probably my eighteenth or nineteenth event. It's one of the top,



**The General Chair contemplating organizing MICCAI 2017**

but it's not the first time I will do so. I was rather involved in doing events for breast cancer all around the world. One of the aspects that gives the researchers a big headache is logistics and dealing with all of that. You always learn something new, but I know my area. I know my city. I have my network to do that. That is not what worries me.

Then the rest is the team. [Maxime Descoteaux](#) is our Program Chair with **D. Louis Collins**. **Lena Maier-Hein** and [Pierre Jannin](#) are in the program committee. I know that they are going to do a bang up job. On the other side we have [Tal Arbel](#) (Satellites Chair), **Parvin Mousavi**, **Kevin Whittingstall** and **Jorge Cardoso**,

so I sleep very soundly. [The team is good.](#)

**Ralph:** What are the chances that you and I will co-sign [the first editorial of the MICCAI Daily 2017?](#)

**Simon:** Right now, it's 100%. Of course, I cannot predict the future. If I did, then I'd be much richer, but I would love to.

Another thing is that we would really like to see an increased presence of the students, which are about 30-40% of the conference. It's really the other way around of what it should be. The university students are the majority, of course.

There are many things that I would like to do to promote students. First, is a decrease in price. The price in Quebec City, for all kinds of reasons, will be at least  $\frac{1}{3}$  less than what it was in previous editions. This will primarily benefit the students. The second thing is to get the student society active in MICCAI. The role they took here is great, and they will be taking that role hopefully a bit more in Quebec City as well.

The third thing we're going to do is have a platform called Jujama, which will be the registration platform. It's also going to be the program platform, social platform, and networking platform. When you plan your week, you can meet people. You can meet industry if you are looking for a job, if you are looking for postdoc, so on and so forth. It's great to follow-up, not just to have MICCAI be a 5 day meeting, but to start a conversation before, during, and after.



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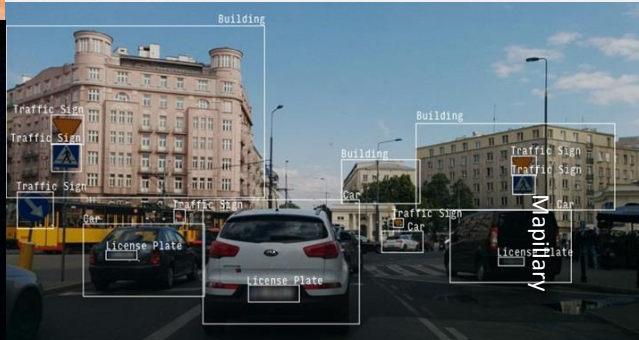
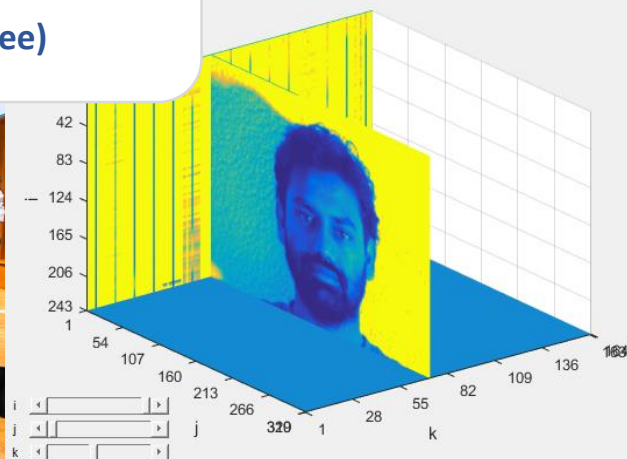
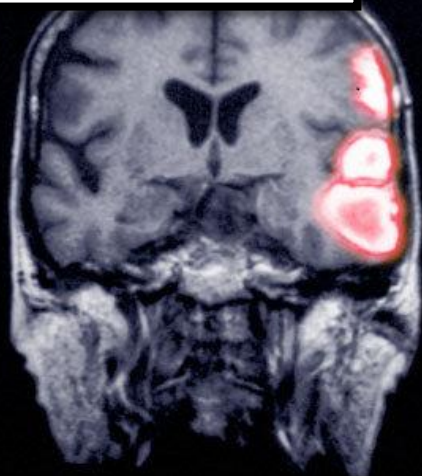
REWORK



```
% invoke the matlab debugger
function STOP_HERE()
[ST,~] = dbstack;
file_name = ST(2).file; fline = ST(2).line;
stop_str = ['dbstop in ' file_name ' at ' num2str(fline+1)];
eval(stop_str)
```



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