
Artificial intelligence at the Faculty of Computer Science Iasi

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Content

Courses

Undergraduate

Master

Doctoral

Projects

Doctoral students

Competitions

ImagoMol

Collaborations with companies



Courses



FACULTY OF
COMPUTER SCIENCE
IAȘI



UNIVERSITATEA
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Home Faculty ▾ Structure ▾

Degree programs ▾

Research ▾

🇬🇧



Evenimente

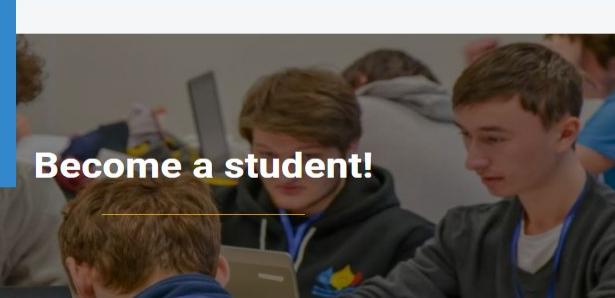
There are no upcoming events at this time.

Overview

Undergraduate studies

Master Studies

Doctoral School



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PLATA ON-LINE
A TAXELOR



Legături Rapide

> Anul Universitar 2020 – 2021

> Orar

> Companii IT @ FII

> Relații internaționale

> ROSE – InFIInit

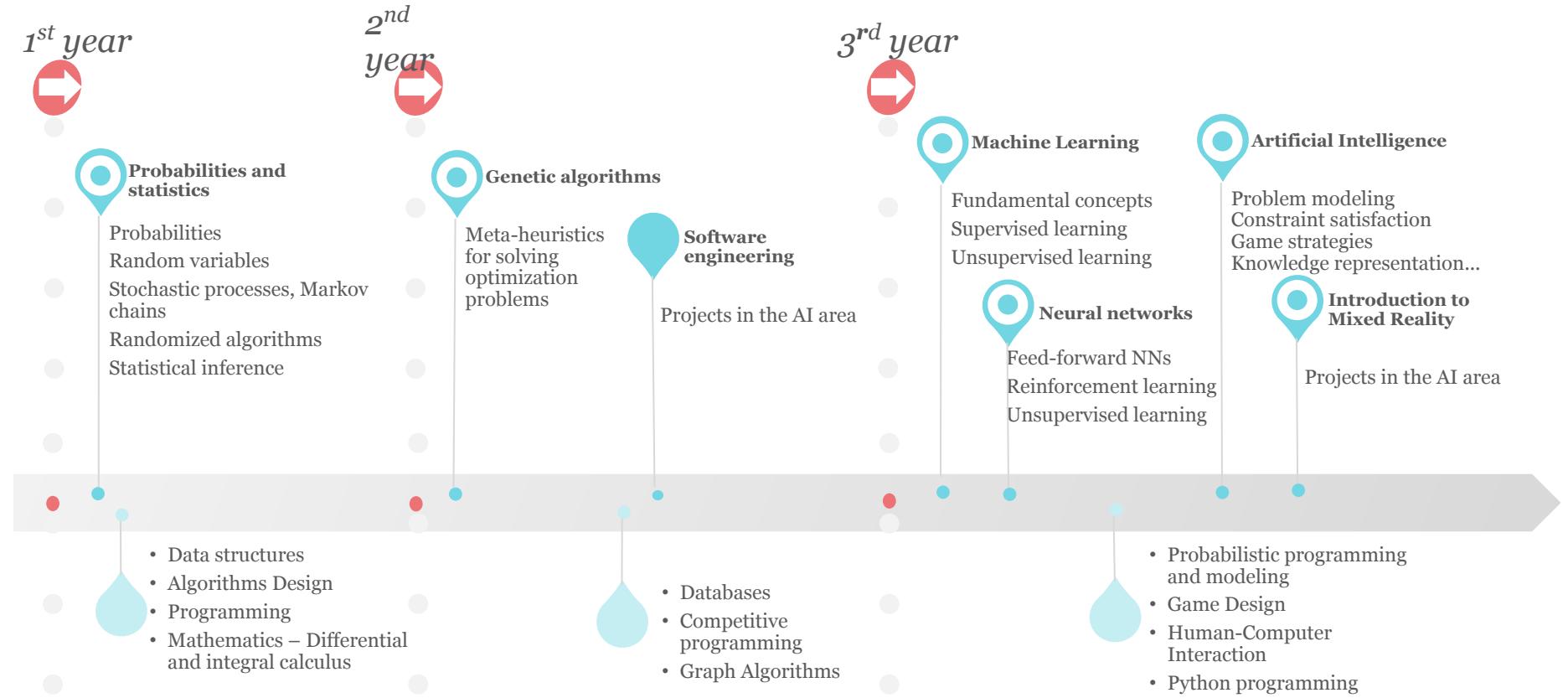
> Webmail (Studenți)

> Webmail (Profesori)

> Sims Web

> Credidictiune Profesională

Undergraduate studies



Master



Home Faculty ▾ Structure ▾

Degree programs ▾

Research ▾

EN



Master Studies

Master Studies in Computer Science – full time studies (with a duration of 3 years, in the Bologna system); the purpose of these programmes is the additional and complementary specialization of the graduates in computer science or in other domains. At present, the Faculty of Computer Science offers the following five master programmes:

- Software Engineering (EN)
- Computational Linguistics (EN)
- Computational Optimization (EN)
- Distributed Systems (EN)
- Information Security (EN)
- Advanced Studies in Computer Science (EN)



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din IAŞI

Legături Rapide

> Anul Universitar 2020 – 2021

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> Webmail (Studenți)



> Webmail (Profesori)



> Sims Web



> Credite didactice – Perfectionare

Graduate studies in AI



**Professional
master**

Artificial Intelligence and optimization (former Computational Optimization)



**Research
master**

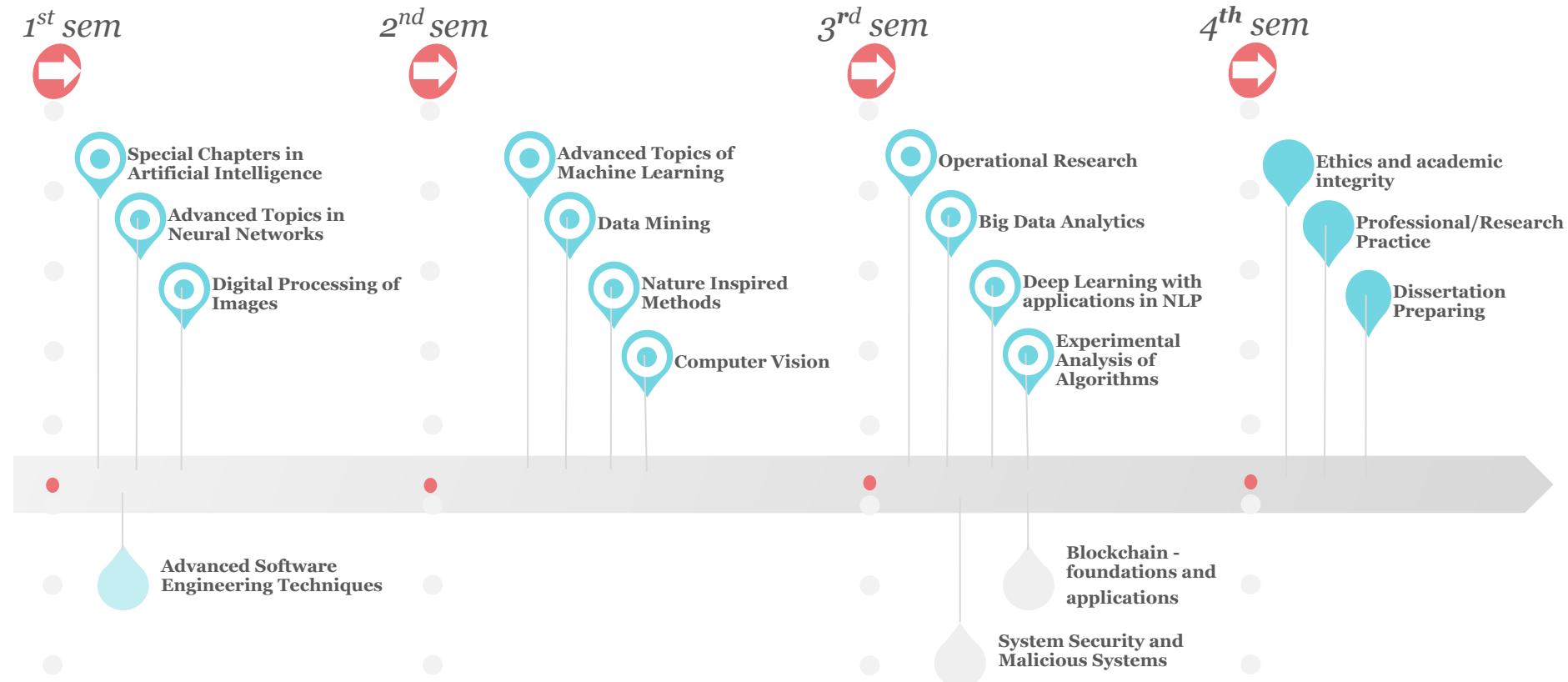
Advanced studies in Computer Science



**Professional
master**

Computational Linguistics

Master in Artificial Intelligence and Optimization (Computational Optimization)



Master in Computational Linguistics

Applications of natural language processing

Introduction to computational linguistics

Statistical Natural Language Processing

Speech processing and fuzzy systems

Machine Translation

Special Chapters on Artificial Intelligence

Collaborations - Using artificial intelligence in Medicine

Current Local Projects using AI in Medicine

Robotics in medicine - Past, present and future

Content

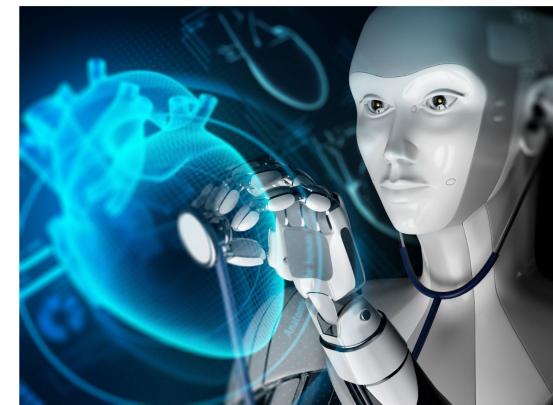
- CLEF Labs
- Biometrics
- Atrial Fibrillation
- REVERT Project
- Kaggle Competitions
- Future Work
- Conclusions



A screenshot of a Kaggle competition interface. At the top, there's a dashboard with various metrics and a map showing "USER SAFE". Below the dashboard, there are two small ECG plots labeled "Normal ECG" and "Atrial fibrillation". Underneath these plots, there are diagrams of the heart with labels for the "Sinoatrial (SA) node", "Atrioventricular (AV) node", "Right bundle branch", "Left bundle branch", "Purkinje fibers", "Left atrium", "Left ventricle", and "Erectile impulses". At the bottom of the interface, there's a navigation bar with icons for help, file, team, visual, leaderboard, and metric prediction, followed by the text "A platform for predictive modeling competitions." and the quote "We're making data science into a sport."

Contents

- Introduction
- Robotics - Procedural Role
- Example of Robots
- Surgical Robots
- Industrial Robots
- Future Work



Doctoral



Prof. Univ. Dr. Adrian Iftene

**Inteligenta artificiala și Folosirea tehnologiilor noi
în îmbunătățirea calității vieții**



Prof. Univ. Dr. Dan Cristea
Sisteme expert și prelucrarea limbajului natural

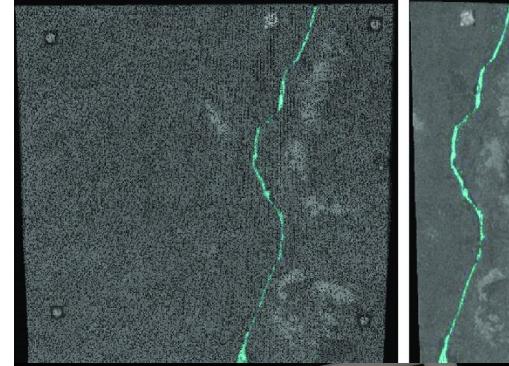


Prof. Univ. Dr. Henri Luchian

Metode de optimizare inspirate din natură

Projects - Doctoral students

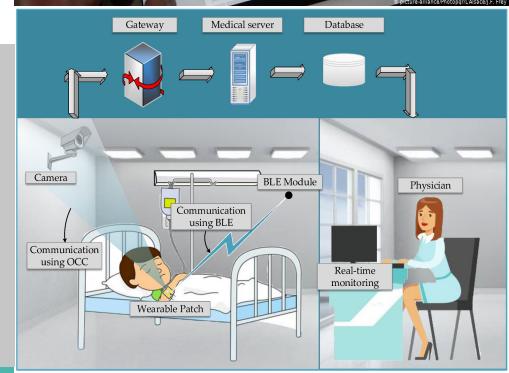
Crack detection - Georgiana Coca



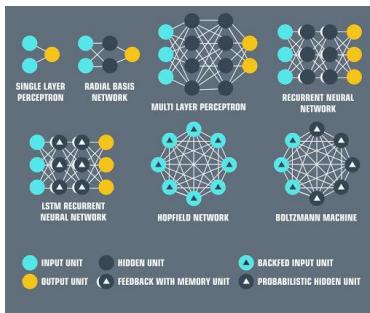
Fake news - Ciprian Cusmuliuc



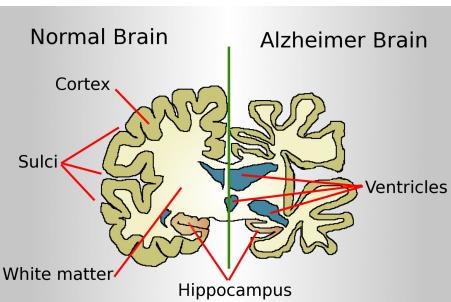
Real-time monitoring of patients using IoT - Camelia Milut



Neural networks - Cristian Simionescu



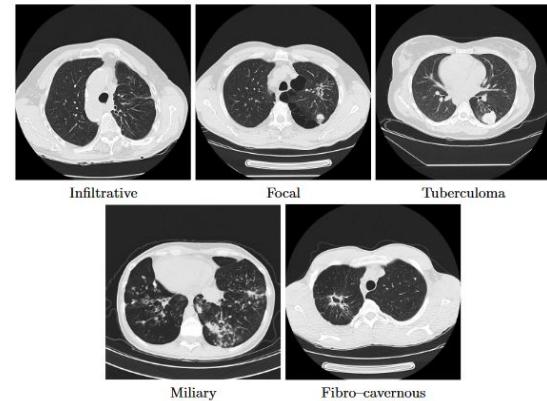
Detecting Early Alzheimer's - Ingrid Stoleru



Projects - Competitions

ImageCLEFmed Tuberculosis

<https://www.imageclef.org/2021/medical/tuberculosis>



SemEval - International Workshop on Semantic Evaluation

<https://semeval.github.io/>

Kaggle Competitions <https://www.kaggle.com/competitions>

AI Crowd Challenges

<https://www.aicrowd.com/challenges/addi-alzheimers-detection-challenge>

Projects - ImagoMol - REVERT



REVERT – taRgeted thErapy for adVanced colorEctal canceR paTients



IMAGO-MOL Cluster is partner within the project **REVERT – taRgeted thErapy for adVanced colorEctal canceR paTients**, funded by Horizon 2020, SC1-BHC-02-2019: **Systems approaches for the discovery of combinatorial therapies.**

The project consortium gathers 14 partners from Italy, Spain, Sweden, Germany, Luxembourg, and Romania, coordinated by San Raffaele Roma SRL.

The consortium structure:

- SAN RAFFAELE ROMA SRL (IT)
 - AZIENDA ULSS 4 VENETO ORIENTALE (IT)
 - MALMO UNIVERSITY (SE)
 - GENXPRO GMBH (GE)
 - FEDERAL INSTITUTE FOR MATERIALS RESEARCH AND TESTING (GE)
 - UMEA UNIVERSITY (SE)
 - BIOVARIANCE GMBH (GE)
 - FUNDACION UNIVERSITARIA SA



Search

Search... 

News

Presentation of the REVERT project within the webinar
“European Actions to fight Cancer: a new EU approach to prevention, treatment and care”

28 April 2021

IMAGO-MOL presentation during the “Bridging the gap” workshop

28 April 2021

The IMAGO-MOL Cluster has developed the initiative “Interegional platform for new

Projects - ImagoMol - Hack4Life, Be a Stroke hero

← → C imago-mol.ro/hack4life-be-a-stroke-hero-february-15-2020/?lang=en



UNIUNEA EUROPEANĂ GUVERNUL ROMÂNIEI Instrumente Structurale 2007 - 2013



iMAGO•MOL
Clusterul Regional Inovativ de
Imagistică Moleculară și Structurală
Nord-Est



SILVER Cluster Management Excellence
DEDICATED TO CLUSTER EXCELLENCE

HOME ABOUT US PROJECTS NEWS RESOURCES MEMBERS PHOTO GALLERY CONTACT

[Home](#) / [News](#) / Hack4Life, Be a Stroke hero, February 15, 2020

Hack4Life, Be a Stroke hero, February 15, 2020

IMAGO-MOL Cluster and the Faculty of Informatics from “Al.I.Cuza” University of Iasi organize **Hack4Life, Be a Stroke hero**, a hackathon dedicated to developing a fast stroke recognition application and an alert program and stroke registration to the emergency units in the region.

We are looking for volunteer programmers, willing to join us in this action.

If you want to contribute to the development of an application that can save lives, we expect you on **February 15, 2020, starting at 9.00 am**, in Room C309 from the Faculty of Informatics at the University “Al.I.Cuza” in Iasi.

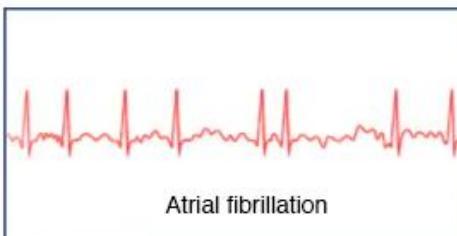
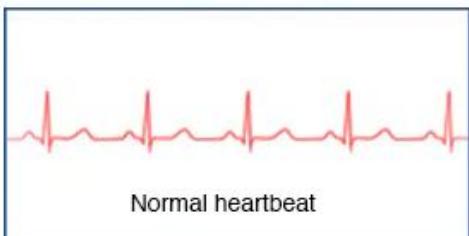
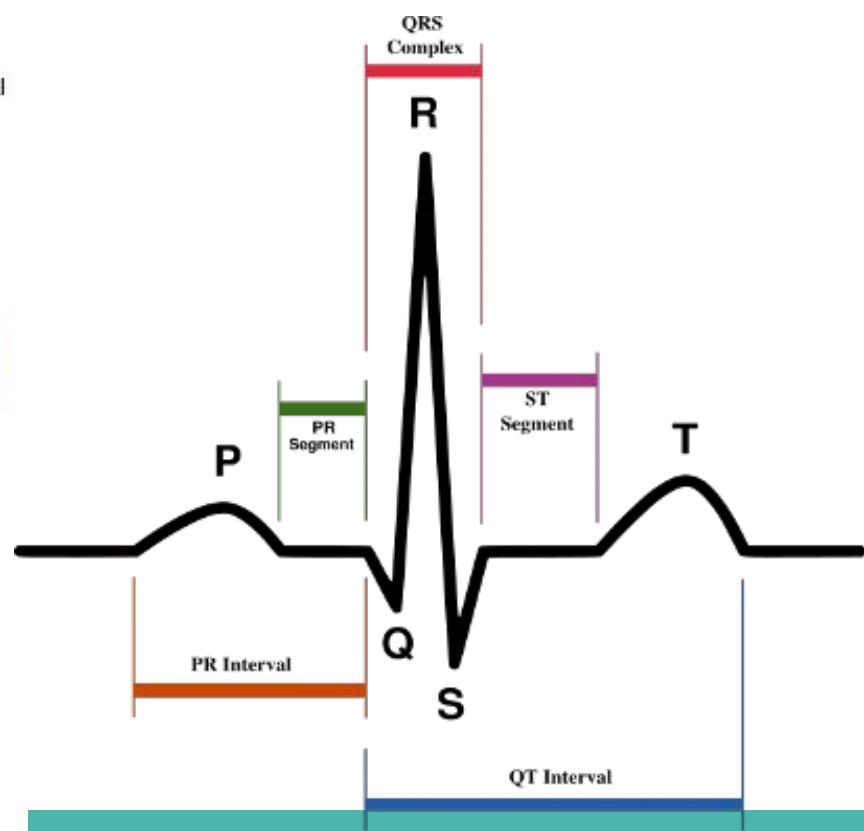
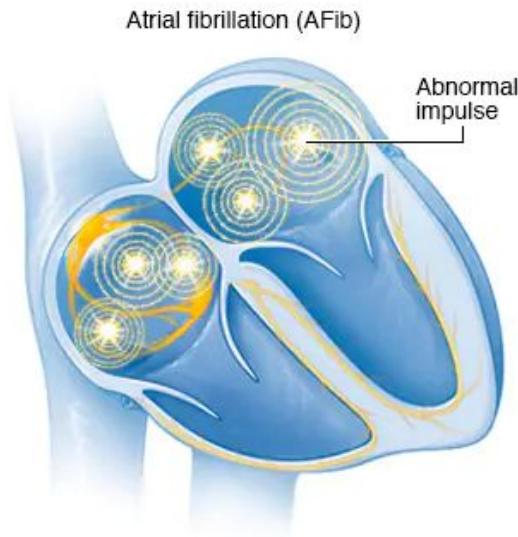
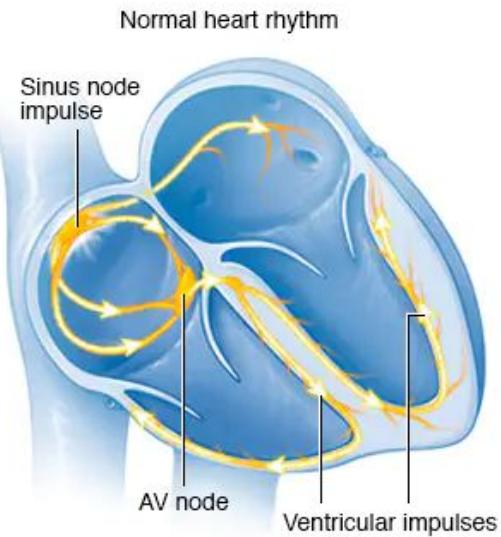
Search



News

[Presentation of the REVERT](#)

Projects - Atrial Fibrillation



**More projects in the medical domain...
...more collaborations**

01.

**Lung lesions detection
and classification**





Context: Covid/pneumonia detection in xRays

Hypothesis: Chest Xray is one of the fastest and safest ways to detect signs of COVID-19 infection. AI can facilitate diagnosis of patients who present symptoms related to Covid-19

Approach:

- classify xRay images into covid, pneumonia and healthy classes
- highlight affected areas (consolidations and linear opacities)
- Identify similar cases available in the hospital database



Context: Tuberculosis related affections (ImageClef competition)

Tuberculosis is a persistent threat and a leading cause of death worldwide according to WHO. Generally, TB can be cured with antibiotics. However, the different types of TB require different treatments, and therefore the detection of the TB type and the evaluation of lesion characteristics are important real-world tasks.

ImageClef tasks

2020: automated CT report generation: *presence of TB lesions in general, or pleurisy or caverns*

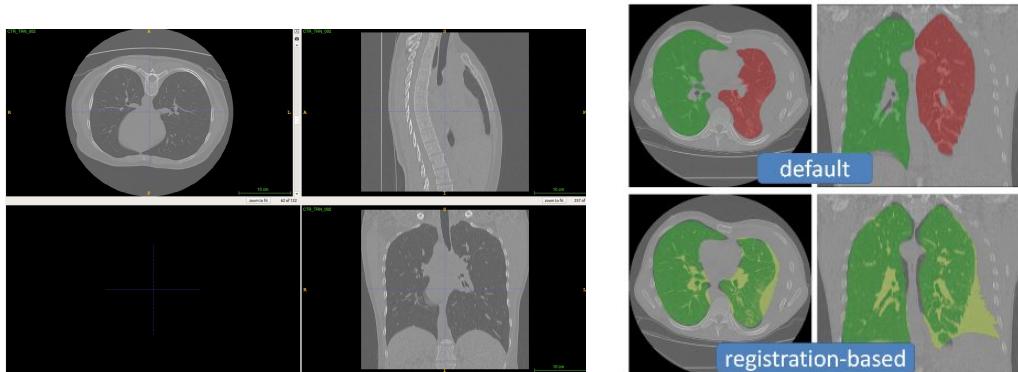
2021: *TB type classification*

2020 DATA

283 CTs, each presenting at least one lung affected:

- 19 pleurisy
- 126 caverns

Filename	LeftLungAffected	RightLungAffected	CavernsLeft	CavernsRight	PleurisyLeft	PleurisyRight
CTR_TRN_001.nii.gz	1	0	0	0	0	0
CTR_TRN_002.nii.gz	0	1	0	0	0	0
CTR_TRN_003.nii.gz	1	1	0	0	0	0
CTR_TRN_004.nii.gz	1	0	0	0	0	0
CTR_TRN_005.nii.gz	1	0	0	0	0	0
CTR_TRN_006.nii.gz	0	1	0	0	0	0
CTR_TRN_007.nii.gz	0	1	0	1	0	0
CTR_TRN_008.nii.gz	1	1	0	0	0	0
CTR_TRN_009.nii.gz	1	1	0	1	0	0
CTR_TRN_010.nii.gz	0	1	0	0	0	0
CTR_TRN_011.nii.gz	0	1	0	1	0	0
CTR_TRN_012.nii.gz	1	1	0	0	0	0
CTR_TRN_013.nii.gz	1	1	0	0	0	1





2020 winner

Our Submissions

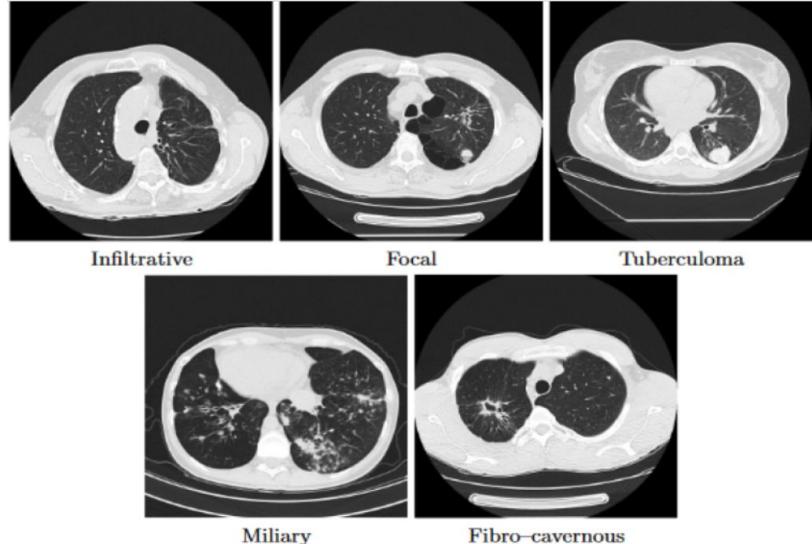
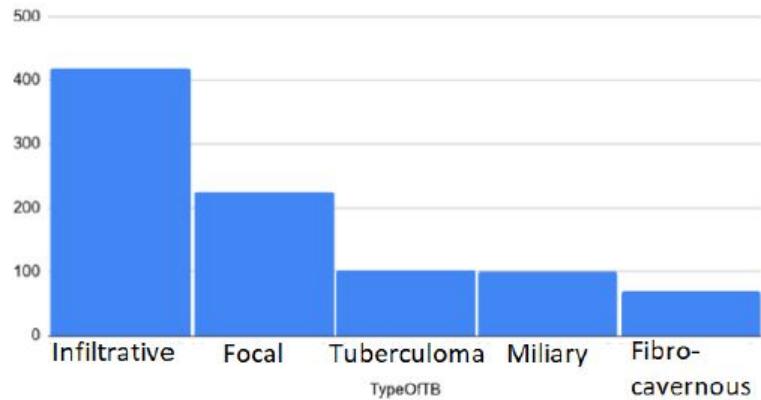
Method	mean AUC	min AUC
ResNet50Proj	0.825	0.766
PreProcProj	0.793	0.703
NaiveInception	0.860	0.772
ThresholdInception	0.887	0.821
AttentionInception	0.853	0.788
TwoPicInception	0.892	0.830
NaiveSliceCE	0.924	0.885
MicroVolSliceCE	0.922	0.860
NaiveSliceBCE	0.899	0.862



Leaderboard filters							
Δ	#	Participants	mean_auc	min_auc	Entries	Last Submission	Submission Trend
•	01	SenticLab.UAIC	0.924	0.885	10	Sun, 7 Jun 2020 23:53	
•	02	SDVA-UCSD	0.875	0.811	11	Fri, 5 Jun 2020 07:54	
•	03	chejiao	0.791	0.682	8	Sun, 7 Jun 2020 14:41	
•	04	CompElecEng...	0.767	0.733	12	Mon, 1 Jun 2020 22:20	
•	05	KDE-lab	0.753	0.698	11	Fri, 17 Apr 2020 10:28	
•	06	FAST NIU DS	0.755	0.611	9	Fri, 17 Apr 2020 07:10	

2021 DATA

917 TB patients





Our Submissions

Method	kappa
S 3DNLR50	0.169
HS 3DNLR50	0.174
FS 3DNLR50	0.183
MS 3DNLR50	0.187
Ef comb1	0.192
Ef comb2	0.194
Ef MLP	0.203
Ef comb3	0.205
Ef MLP LogReg	0.221

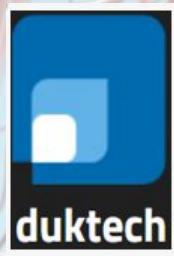


Leaderboard filters						
Δ	#	Participants	kappa	acc	Entries	Last Submission
+	01	SenticLab.UAIC	0.221	0.466	11	Sun, 9 May 2021 22:19
-	02	hasibzunair	0.200	0.423	11	Thu, 6 May 2021 20:02
+	03	SDVA-UCSD	0.190	0.371	8	Sun, 9 May 2021 22:34
+	04	Emad_Aghajani...	0.181	0.404	11	Sun, 9 May 2021 20:19
+	05	MIDL-NCAI-CUI	0.140	0.333	5	Thu, 6 May 2021 11:53
+	06	uaic2021	0.129	0.333	4	Sun, 9 May 2021 21:49
+	07	IALab_PUC	0.120	0.401	4	Fri, 7 May 2021 07:24
-	08	KDE-lab	0.117	0.382	13	Sun, 2 May 2021 10:35
+	09	JBTTM	0.038	0.221	1	Fri, 7 May 2021 13:07
-	10	Zhan Shi	0.017	0.220	1	Fri, 7 May 2021 13:10

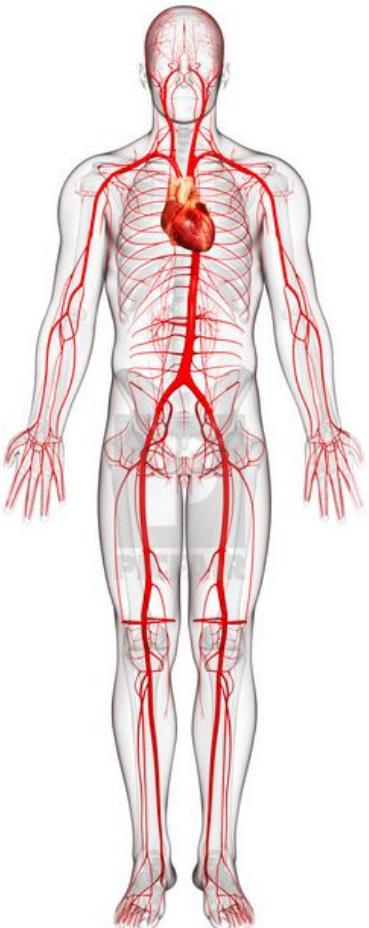


02.

PAD assessment in angioCTs

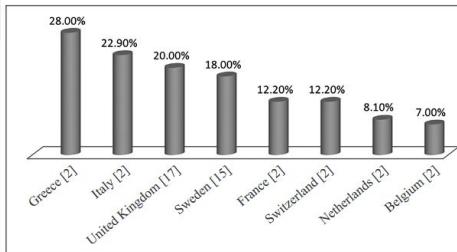
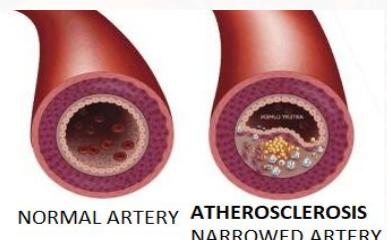


Peripheral Arterial Disease (PAD)

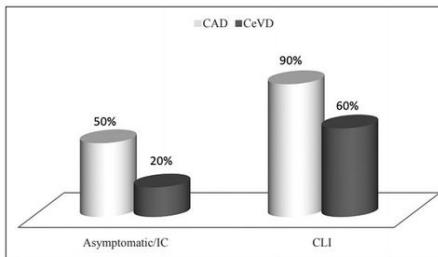
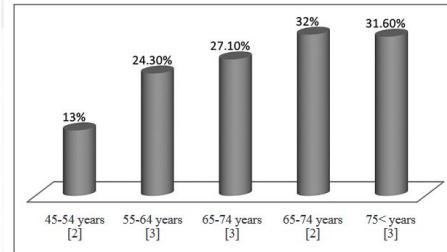


A disease in which plaque builds up in the arteries that carry blood to the head, organs, and limbs

- hardens and narrows the arteries, limiting the flow of oxygen-rich blood to the organs and other parts of the body
- associated with a marked increase in cardiovascular (CV) risk
- early treatment of PAD may lead to a decrease in future atherosclerotic events and CV mortality

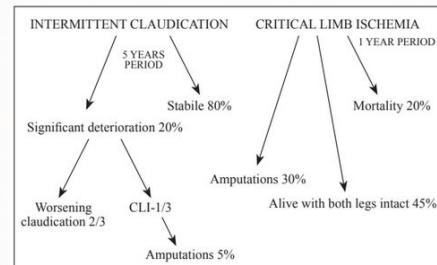


PAD prevalence in European countries



Prevalence of CVD comorbidities in PAD patients

PAD prognosis



Epidemiology of peripheral artery disease in Europe: VAS Educational Paper

International Angiology 2018 August;37(4):327-34



Project Objectives



Develop an intelligent software system able to automatically identify the arteries, detect abnormalities and facilitate the diagnosis in Angio-CTs.

1. Development of artery segmentation algorithms based on computer vision and deep learning
2. Development of the software module that detects abnormalities and aids the doctor by decreasing the time for image study
3. Implementation of an interactive viewer for the DICOM images that provides sagittal and coronal reconstruction functionality and integrates the AI module for artery segmentation and occlusion detection
4. Deployment in a clinical environment

03.

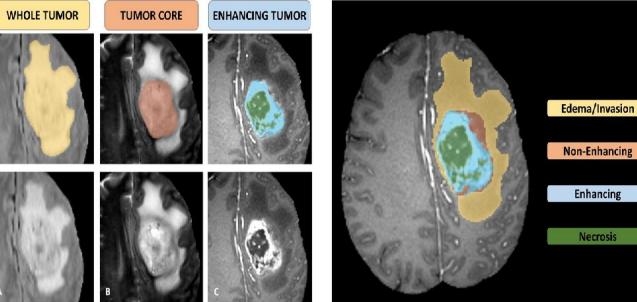
**Brain tumor segmentation
and survival estimation**



Context:

Gliomas are the most common primary brain malignancies, with different degrees of aggressiveness, variable prognosis and various heterogeneous histological sub-regions, i.e., peritumoral edema, necrotic core, enhancing and non-enhancing tumor core. Due to this highly heterogeneous appearance and shape, segmentation of brain tumors in multimodal MRI scans is one of the most challenging tasks in medical image analysis.

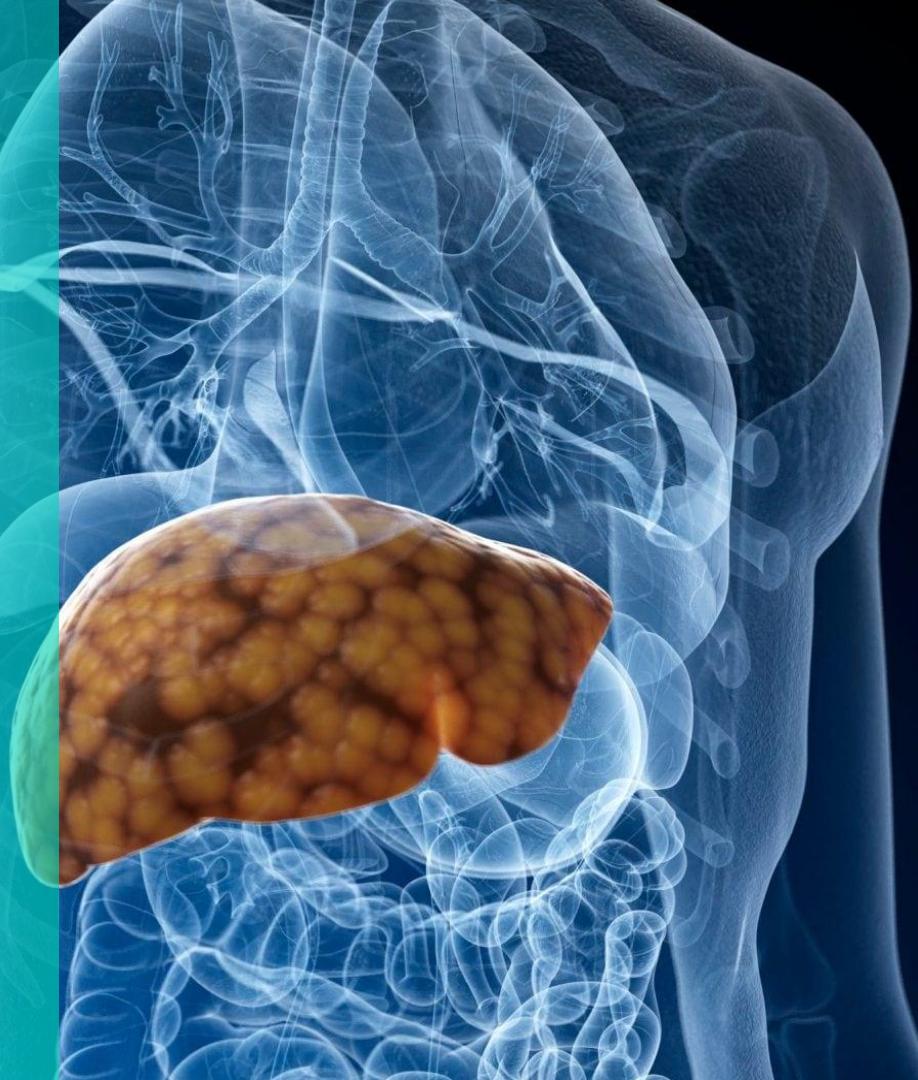
BRATS 2020 tasks: produce segmentation labels of the different glioma sub-regions (**the "enhancing tumor" the "tumor core" and the "whole tumor"**) and predict patient overall survival



Glioma sub-regions. Image patches with the tumor sub-regions annotated in the different MRI modalities. The image patches show from left to right: whole tumor (WT - yellow) visible in T2-FLAIR (Fig. A), the tumor core (TC - orange) visible in T2 (Fig. B), the enhancing tumor (ET - light blue) visible in T1d, surrounding the cystic/necrotic components of the core (green) (Fig. C). The segmentations are combined to generate the final labels of the tumor sub-regions (Fig. D): edema/invasion (yellow), non-enhancing solid core (orange), necrotic/cystic core (green), enhancing core (blue). (Figure taken from the BrATS IEEE TMI paper)

04.

Liver tumour detection and segmentation



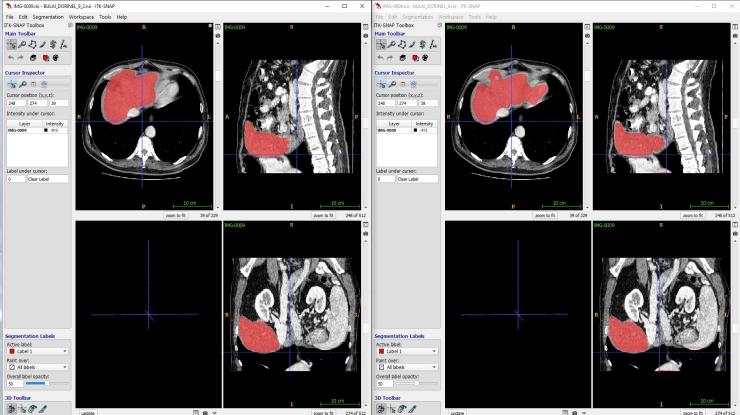
Context:

Development of a software capable of detecting the presence of hepatocarcinoma in CTs

The typical protocol at **IRO** includes 4 acquisitions (scans):

- Native acquisition (without contrast);
- Post-contrast acquisition in arterial time; within ~ 35 seconds after intravenous contrast injection
- Post-contrast acquisition in portal venous time; at ~70-80 seconds after the injection;
- Delayed post-contrast acquisition, 3-4 minutes after the contrast injection

The diagnosis of HCC is made based on the way in which these tumors look at different acquisition times



05.

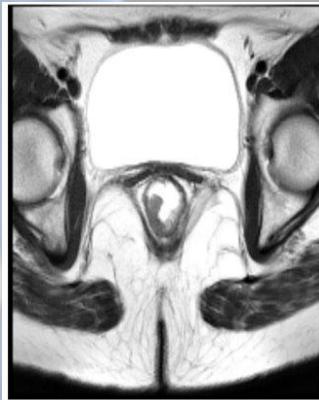
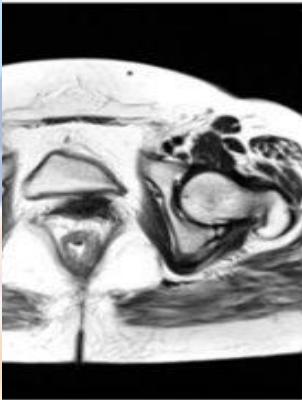
**Colorectal tumour
segmentation**



Context:

Colorectal cancer is the third most commonly diagnosed cancer in men and women. Since tumor stage at time of diagnosis is a critical determinant of patient outcome, early detection of colorectal cancer by screening modalities holds the key to improving patient survival.

IRO tasks: identify colorectal tumors in MRIs; analyze the evolution during radio-therapy



06.

Clog Loss: Advance Alzheimer's
Research with Stall Catchers

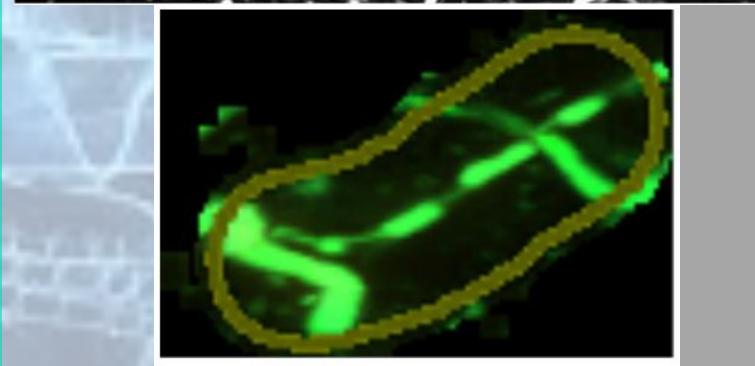
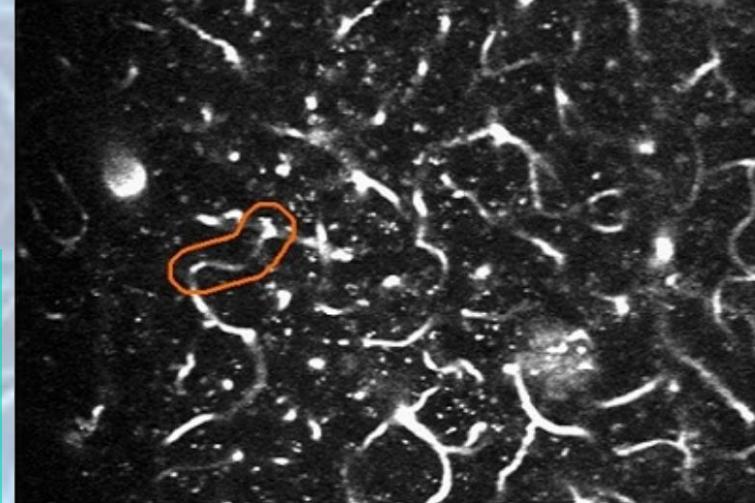




Context:

It is known that reduced blood flow (stalled vessels) in the brain is associated with Alzheimer's disease and other forms of dementia, but until recently no one knew why. Researchers from Cornell University have developed new imaging techniques which might tell them the reason, but they need to speed up the detection of stalled vessels. Using artificial intelligence, may speed up their research by 10 times.

Clog Loss tasks: Using half of million of annotated two-photon excitation microscopy videos, find the stalled vessels for a very unbalanced dataset.



8th place on the
leaderboard
(out of 900 participants)

THANK YOU!