My Way of Teaching AI

Dan Cristea
“Alexandru Ioan Cuza” University of Iași, Faculty of Computer Science
Iași branch of the Romanian Academy, Institute for Computer Science
dcristea@info.uaic.ro
The main ideas…

- Knowledge now is everywhere and is free
- Being creative is wanted, daring and expensive…
  - More than searching for professionals able to accurately perform the given specifications when building software, IT companies look for people capable to improve, to innovate, to bring in the new
- The University is the optimum place for extravagant research
- No one is controlling you…
The joy of teaching

🧳 Some 40 years ago I was asked by my best friend, with whom I was having one of my most exciting research collaborations...

🧳 Living the office with no plan for the lesson to teach… and entering the classroom with an idea in mind...

🧳 Being on the wage state of the University, we, as professors, have two obligations: to teach and to do research. Isn’t it too much?!

🧳 We are all grateful to the University for giving us the freedom to be creative
Creativity in the act of teaching?

- Teaching well-established, classical, knowledge...
  - Give to students the basic level, drop by drop, in the old-fashioned style?
    - => fixing ground information
    - => finding ways of presentation that illuminates
  - Trying to bring the student at the level of SOTA?...
    - => by suggesting readings
    - => reaching it by... teaching
- I feel uncomfortable... when teaching only well established knowledge
- How can we teach the student to be creative?
My courses

- For 3rd year undergraduate in CS
  - Artificial Intelligence (first semester)
    - basics of AI
  - Rule-Based Programming (second semester)
    - basics of Expert Systems, CLIPS

- For 1st year master students in Computational Linguistics
  - Introduction to Computational Linguistics
    - the domains of CL and NLP at sub-syntactic, syntactic and discourse levels

- At the Doctoral School
  - How to organise the doctoral research, how to write scientific papers, specific topics adequate to my PhD students
Contents of courses

- Introduce the domain (1-2 c.)
- Present an “impossible to solve” problem (1 c.)
- Design interactively a solution (7-8 c.)
- Give them other basic topics by showing how they are applied in the problem at hand (rest of c.)
How is work organised

- Class split in two => two similar large projects
- Both projects have more or less the same architecture (modules)
- Each module: a team (8-12 students)
- One team is affiliated to both projects: specifications of inter-module communication standards, evaluation, project’s web page
- Notation per student = average of 3 marks: personal, per module, per system
- Competitive presentations at the end of term
- Inspire diploma thesis, project proposals, participation in competitions, scientific papers, etc.
- Best solution presented at BringITon!
The BringITon! series...

BringITon! 2016

Workshop de promovare și valorificare a interacțiunii între cercetarea informatică universitară și mediul de afaceri

18-19 noiembrie 2016

Connecting student research with industry
2003: Simulation of a football game

- Intelligent agents:
  - Players: seeing around, recognising team-mates, passing, receiving the ball, dribbling
  - The ball: when hit, moving conforming to the laws of ballistics, friction, etc.
  - The field: knowing at each moment the position of players and ball, recognising when the ball is outside, in offside, etc.
- A graphical interface...
2004: An automatic translation system

 настоящее переводческая модель (символическая)

- Two societies that conquer to survive and develop:
  - “Manikin”: evolving from birth to death, male and female
    - They learn, work, make families, procreate, build, are happy/unhappy
  - On the common territory: resources (iron, forests, fields, etc.)
  - Manikins mine for iron, cut trees to build houses/institutions, cultivate fields & grow forests, hunt wild animals, etc.
- Each society is governed by rules (some common, some specific) and is measured according to unique criteria:
  - Levels of: happiness, knowledge, institutions, properties, peace
2007: The Intelligent House

- A house in which most of the objects are “intelligent”, in the sense that they communicate with each others to:
  - maximize the level of comfort of the family (leisure)
  - assure security
  - minimize costs
- The house seizes the place of each of its members at any time
- Learns preferences of members and adjusts its behavior
2008: The Talking Head

- An avatar reading a text and exposing sentiments on its face as related to the content
Assistant agents (artificial butlers)

- Agents running on mobile phones, capable to understand the situations their Masters are engaged in:
  - 2010 + 2011, following an idea of prof. Yorik Wilks => Companion: serve Master according to the necessities of the current situation
  - 2014, following a H2020 project proposal, with Technical University of Vienna => MyDailyLife
- Rules of good service => discrete, anticipative, trustful
2012: Following Companion: HYMAS
“Help Your Master in Any Situation”


Exposures on Youtube
2014: MyDailyLife

- Help elderly people to lower the effects of degenerative illnesses (Alzheimer, Parkinson, depression, etc.).
- Exploit sensors of the mobile: the agent records the patient’s day
- An ontology of situations helps it reason regarding to causes and goals
- At the end of the day it engages the patient into a conversation
Situations graph – class hierarchy

- alive
  - awake
    - at_home
    - in_activity
  - moving
    - driving
      - driving_in_town
    - walking
    - jogging
    - driving_outside
  - not_moving
    - sleeping
2013: MappingBooks - creating a more intimate link between the book and its reader

- Recognise mentions of locations in text
- Crawl the web for supplementary information
- Know where the reader is =>
  - Point entities mentioned in the text that are in the reader’s proximity
  - Trace them on maps
  - Mix images with generated info
2017: Generate student exam tests from medical manuals
New topics

- Protégé and OWL
- Ontology extraction from texts
  - Lexico-syntactic patterns (path patterns)
  - Generalisation of patterns
  - Hypernymy detection: classifiers
  - Evaluation of patterns
- Ontology merging
- Question generation: multiple-choice, fill-in-the-blanks, yes-no, matching
The adult cerebral blood flow is about 750-1000 ml/min, representing 15-20% of the heart blood flow.
Master students in CL => building a large corpus: H. Sienkiewicz’s *Quo Vadis*

- Two book chapters engaged (in Springer and IGI Global), one conference paper
- A connected PhD theme
Entity linking

- Challenges in entity linking:
  - name variations
  - ambiguities
  - absence
  - entity
  - link type
Building the QuoVadis corpus

Feb. – Jun. 2013
– annotators: 12 master students, first year in MCL
– no programming

– annotators: 3 master students second year in MCL (experts)
– programming: 1 PhD student, 1 master student
love and worship relationships in Quo Vadis
Affective relations *fear-of* and *hate*
Vinicius’ links with other characters
Conclusions

 gezocht

 Research and teaching must go together

 As a “professor+researcher” you can do it more ways:

 ✤ First experiment with students daring project ideas, then root your project proposals on them
 ✤ First, participate in projects, then conceptualise the knowledge acquired and teach it
 ✤ Recycle and reinvigorate failed projects through teaching
 ✤ Advance the SOTA in publications by iteratively enhancing student work at all levels
Come to Iași...

- **ConsILR-2018, 25-27 October 2018**
  - International Conference on Linguistic Resources and Tools for Processing Romanian Language

- **BingITon!-2018, 22-23 November 2018**
  - Workshop to promote and capitalize on the interaction between university computer science and the business environment
Thank you!
Acknowledgements

❖ To my young collaborators: Mihaela Colhon, Adrian Iftene, Ionuț Pistol, Mădălina Rășchip, Diana Trandabăți, Marius Zbancioc

❖ To my ex and present PhD students: Daniel Anechitei, Paul Diac, Andreea Gagea, Daniela Gîfu, Eugen Ignat, Maria Husarciuc (Moruz), Cătălina Mărănduc, Elena Mitocariu, Alex Moruz, Augusto Perez, Laura Pistol, Marius Rășchip, Andrei Scutelnicu, Radu Simionescu

❖ To all series of undergraduate and master students that worked with me in the period 2003-2018

❖ To MappingBooks, CoRoLa and ReTeRom, the recent projects