My Way of Teaching Artificial Intelligence

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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 pleasure 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 Universtiy, we, as professors, have two obbligations: 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?...

=> only by advising readings

=> but, sometimes, you could try reaching that level 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 common to both projects: specifications of inter-module communication standards, evaluation, project’s web page
- Notation per student = average of 3 scores: personal, module, system
- Competitive presentations at the end of semester
- Best solution presented at BringITon!
- Inspire diploma thesis, project proposals, participation in competitions, scientific papers, etc.
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

The transfer model (symbolic)

- 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 this 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”

Prototype built during the
**International Create Challenge Competition, Sept. 2012, Martigny,**

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
      - shopping
      - in_park
    - in_theater
  - moving
    - driving
    - walking
    - jogging
  - not_moving
    - sleeping
    - driving_in_town
    - driving_outside

- First place in the Bring IT on!-2016 saloon of IT students creation
- An UEFISCDI project that has run between 2014 – 2016:
  - partners: UAIC-FII (coordinator), University “Ștefan cel Mare” Suceava, Siveco – Bucharest
- Many conference papers
MappingBooks: what is it about?

Creating a more intimate link between the book and its reader

- Recognise in text mentions of locations
- 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
- Multiple choice question generation
The adult cerebral blood flow is about 750-1000 ml/min, representing 15-20% of the heart blood flow.
2013-2014: *Quo Vadis* - Deciphering relations between book characters

- 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
I need help to remember all kinship relations between characters.
# Characters in Forsyte Saga

<table>
<thead>
<tr>
<th>The old Forsytes</th>
<th>Thg young Forsytes</th>
<th>Their children</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ann, the eldest of the family</td>
<td>Young Jolyon, Old Jolyon's artistic and free-thinking son, married three times</td>
<td>June, Young Jolyon's defiant daughter from his first marriage; engaged to an architect, Philip Bosinney, who becomes Irene's lover</td>
<td>Val, Winifred and Montague's son; fights in the Boer Wars; marries his cousin Holly</td>
</tr>
<tr>
<td>Old Jolyon, the patriarch of the family, having made a fortune in tea</td>
<td>Soames, James and Emily's son, an intense, unimaginative and possessive solicitor, married to the unhappy Irene, who later marries Young Jolyon</td>
<td>Jolly, Young Jolyon's son from his second marriage; dies of enteric fever during the Boer Wars</td>
<td>Imogen, Winifred and Montague's daughter</td>
</tr>
<tr>
<td>James, a solicitor, married to Emily, a most tranquil woman</td>
<td>Winifred, Soames's sister, one of the three daughters of James and Emily, married to the foppish and lethargic Montague Dartie</td>
<td>Holly, Young Jolyon's daughter from his second marriage, to June's governess</td>
<td>Others</td>
</tr>
<tr>
<td>Swithin, James's twin brother with aristocratic pretensions; a bachelor</td>
<td>George, Roger's son, a dyed-in-the-wool mocker</td>
<td>Jon, Young Jolyon's son from his third marriage, to Irene, Soames's first wife</td>
<td>Parfitt, Old Jolyon's butler</td>
</tr>
<tr>
<td>Roger, &quot;the original Forsyte&quot;</td>
<td>Francie, George's sister and Roger's daughter, emancipated from God</td>
<td>Fleur, Soames's daughter from his second marriage, to a French Soho shopgirl</td>
<td>Smither, Aunts Ann, Juley and Hester's housekeeper</td>
</tr>
<tr>
<td>Julia (Juley), a fluttery dowager; Mrs. Septimus Small</td>
<td></td>
<td>Annette, Jon's lover; later marries a baronet, Michael Mont</td>
<td>Warmson, James and Emily's butler</td>
</tr>
<tr>
<td>Hester, an old maid</td>
<td></td>
<td></td>
<td>Bilson, Soames's housemaid</td>
</tr>
<tr>
<td>Nicholas, the wealthiest in the family</td>
<td></td>
<td></td>
<td>Prosper Profond, Winifred's admirer and Annette's lover</td>
</tr>
<tr>
<td>Timothy, the most cautious man in England</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
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
Conclusions

- 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
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