Teaching and research in AI/NLP/CL at UAIC-FII

Dan Cristea
“Alexandru Ioan Cuza” University of Iași, Department of Computer Science
Romanian Academy, Iași branch – Institute for Computer Science

dcristea@info.uaic.ro
• AI = Artificial Intelligence
• NLP = Natural Language Processing
• CL = Computational Linguistics
• UAIC = University “Alexandru Ioan Cuza” of Iași
• FII = Facultatea de Informatică din Iași
My talk

• How could research be married with teaching?
• Root project proposals in daring experiments exercised with students
• Teach students the experience gained in projects, even failed
• Advance the SOTA by iteratively enhancing student work
The University and the Faculty

- UAIC – since 1860
- Faculty of Computer Science (FII) – since 1992
  - Since 1965, as the Department of Computing Machines – a section of the Faculty of Mathematics
  - Initially 4 years (assimilated to graduate) => for a short time – 5 years => 3+2+3 years (after applying the Bologna rules)

CHNU, Chernivtsi, 26 February 2014
My courses and their contents

• For 3\textsuperscript{rd} year undergraduate in CS
  – Artificial Intelligence (first semester)
    • basics of AI, news about the domain, how to solve complicated problems
  – Rule-Based Programming (second semester)
    • basics of Expert Systems, CLIPS

• For 1\textsuperscript{st} year master students in Computational Linguistics
  – Introduction to Computational Linguistics
    • the domains of CL and NLP, language processing at under-syntactic, syntactic and semantic level

• At the Doctoral School
  – How to organise your research, how to write scientific papers, specific topics adequate to each PhD student

CHNU, Chernivtsi, 26 February 2014
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.)

CHNU, Chernivtsi, 26 February 2014
AI projects

• 2003-2004: Simulation of a football game
• 2004-2005: An automatic translation system – the transfer model
• 2005-2007: PhiSociety – primitive societies of intelligent agents in competition
• 2007-2008: An intelligent house
• 2008-2009: The talking head
• 2009-2010: Extracting content from texts
• 2010-2012: Companion
• 2012-2013: Let’s talk about books!
• 2014-2015: MyDailyLife
How is work organised

- Class split in two => two similar large projects
- Both projects have the same architecture (modules)
- Each module: a team (8-12 students)
- One team common to both projects: specifications of inter-module standards, evaluation, project’s page
- Notation per student = average of 3 scores: personal, group, system
- Competitive presentations at the end of semester
- Best solution presented at BringITon! – present edition: bringiton.info.uaic.ro
- Root at least one diploma paper in the project

CHNU, Chernivtsi, 26 February 2014
Companion: Help your master in any situation


• Participation in the 3 w. International Create Challenge Competition – Martigny, Switzerland – Sep. 2012

• SEAMA – a project proposal (submitted in Feb. 2013) in FP7-ICT-2013-EU-Brazil (Germany – Univ. of Hamburg, Romania, Spain, Brazil – 1.5 MEUR asked) – failed

• SEAMA2 – planned to be reshaped for H2020

CHNU, Chernivtsi, 26 February 2014
Companion

• An idea of Prof. Yorik Wilks, Universities of Sheffield & Oxford – two times participant in EUROLAN
  – an intelligent agent capable to:
    • “understand” the situation you happen to be in
    • serve you according to the necessities of this situation
Example of behaviour of a Companion

Help Your Master in Any Situation

HYMAS

A day of Michael’s life

21 September 2012

Part of the slides were presented at the International Create Challenge Competition, Sept. 2012, Martigny

http://www.createchallenge.org/about-icc

CHNU, Chernivtsi, 26 February 2014
Michael

Michael is a researcher in IDIAP – Martigny.
He lives in Lausanne and drives his car to reach his office daily.
William

William is the director of an institute in Zurich. Michael is a member of a project lead by William.
Dan

Dan is a professor in Iași.
He and Michael are very good friends, but they see each other rather rarely.
Situation 1
14 September – a week ago

William fixes a project meeting. He uses a Google calendar (shared by the members of the project) to post the details of the meeting, while also using other channels of dissemination.
The event notice arrives in Michael’s Google calendar

CHNU, Chernivtsi, 26 February 2014
Michael’s Hymas builds a plan...

5:00 – Wake up

6:00 – Start driving to Zurich

9:30 – Enter Zurich

10:00 – Enter meeting

CHNU, Chernivtsi, 26 February 2014
ACTION: set alarm

- For 21 September
- At 5:00 am

NOTIFICATION: alarm set for 5:00 in the morning of 21 Sept.
21 September – 1:35 am, Zurich

• An ambulance is running in the night...
• William had a diabetes stroke
• He knows it would be too late to cancel the meeting in the morning
• So, he uses the Hymas network, distributing a message...
William to all:
Meeting on 21 September
10:00 am cancelled
Apologies...

CHNU, Chernivtsi, 26 February 2014
21 September – 1:35 am, Lausanne

• Message received by Michael’s Hymas…
Michael’s Hymas destroys the plan...

5:00 – Wake up
6:00 – Start driving to Zurich
9:30 – Enter Zurich
10:00 – Enter meeting

CHNU, Chernivtsi, 26 February 2014
ACTION: reset alarm for 21 September at 5:00 am

ACTION: Acknowledge Master when awaken:

Alarm for 5:00 reset!

CHNU, Chernivtsi, 26 February 2014
Situation 2

21 September – 7:35 am, Lausanne

• Jane, Michael’s girl friend, wants to make a surprise to her friend
• She instructs her Hymas to send to his Hymas Amy Winehouse’s “You Know I'm No Good”
• Michael is doing his morning jogging
• His Hymas seizes this activity ➔ the jogging situation is triggered
• It streams the piece indicated by a friend onto his mobile
Situation 3

21 September – 8:15 am

• At about this time Michael usually leaves home to go by car to his office
• He drives from Lausanne to Martigny, IDIAP
• His Hymas recognises the driving situation and correlates with the time and the learned working day activity ➔ morningDriveFromHomeToOffice
• It sends an interrogation message to other Hymasses in the traffic and gets data...

CHNU, Chernivtsi, 26 February 2014
Situation 4
21 September – 5:35 pm

• Dan, Michael’s good friend, is living in Iaşi
• This afternoon he has arrived in Martigny
• His Hymas recognises the stoppedInANewCity situation
• Both Hymases know their Masters haven’t meet for more than a year
• Dan and Michael receive notifications that they are in the same city
MappingBooks – Quo Vadis
two related projects

Part of the slides are taken from the talk
given at the

7th International Conference on
Speech Technology and Human-Computer
Dialogue "SpeD 2013" – Cluj-Napoca

http://www.sped2013.ro/

CHNU, Chernivtsi, 26 February 2014
MappingBooks: Jump in the book!

- A project proposal (submitted in May 2013) in the national research projects contest (667.388 EUR); partners: UAIC-FII, University “Ștefan cel Mare” Suceava, Siveco – Bucharest: evaluation still pending
- A term project (Oct. 2013 – Jan. 2014) for 3rd year CS students in AI
- One conference paper

CHNU, Chernivtsi, 26 February 2014
I like to read books and to travel...
Going out of the book...

Adequate for Geography manuals and travelling guides

CHNU, Chernivtsi, 26 February 2014
MappingBooks – an architecture

CHNU, Chernivtsi, 26 February 2014
MappingBooks: what is it about?

• “Understand” parts of a text
• Recognise mentions of persons and locations
• Recognise and crawl for real world entities
• Know where I am
• Seize what real world entities are in my proximity
• Trace GoogleMaps paths, as described in the book
• Fetch, process and make use of geo-data
• Mix images with generated info
• Display an attractive user interface
• Client-server
Quo Vadis

Deciphering relations between book characters

CHNU, Chernivtsi, 26 February 2014
QuoVadis: Deciphering relations between book characters

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

CHNU, Chernivtsi, 26 February 2014
I need help to remember all kinship relations between characters.
Characters in Forsyte Saga

• **The old Forsytes**
  - Ann, the eldest of the family
  - Old Jolyon, the patriarch of the family, having made a fortune in tea
  - James, a solicitor, married to Emily, a most tranquil woman
  - Swithin, James's twin brother with aristocratic pretensions; a bachelor
  - Roger, "the original Forsyte"
  - Julia (Juley), a flattery dowager; Mrs. Septimus Small
  - Hester, an old maid
  - Nicholas, the wealthiest in the family
  - Timothy, the most cautious man in England
  - Susan, the married sister

• **The young Forsytes**
  - Young Jolyon, Old Jolyon's artistic and free-thinking son, married three times
  - Soames, James and Emily's son, an intense, unimaginative and possessive solicitor, married to the unhappy Irene, who later marries Young Jolyon
  - Winifred, Soames's sister, one of the three daughters of James and Emily, married to the foppish and lethargic Montague Dartie
  - George, Roger's son, a dyed-in-the-wool mocker
  - Francie, George's sister and Roger's daughter, emancipated from God

• **Their children**
  - June, Young Jolyon's defiant daughter from his first marriage; engaged to an architect, Philip Bosinney, who becomes Irene's lover
  - Jolly, Young Jolyon's son from his second marriage; dies of enteric fever during the Boer Wars
  - Holly, Young Jolyon's daughter from his second marriage, to June's governess
  - Jon, Young Jolyon's son from his third marriage, to Irene, Soames's first wife
  - Fleur, Soames's daughter from his second marriage, to a French Soho shopgirl Annette; Jon's lover; later marries a baronet, Michael Mont
  - Val, Winifred and Montague's son; fights in the Boer Wars; marries his cousin Holly
  - Imogen, Winifred and Montague's daughter

• **Others**
  - Parfit, Old Jolyon's butler
  - Smither, Aunts Ann, Juley and Hester's housekeeper
  - Warmson, James and Emily's butler
  - Bilson, Soames's housemaid
  - Prosper Profond, Winifred's admirer and Annette's lover

CHNU, Chernivtsi, 26 February 2014
Entity linking

• Challenges in entity linking:
  – name variations
  – ambiguities
  – absence
    • entity
    • link type
Entities

• Type: PERSON/GOD & GROUP
  – Individuals (*Marcus Vinicius, the emperor*), groups (*his mother and father, the soldiers*) and classes (*emperor*)
  – Syntactic realisation: NPs (determiners, adjectives, complement PPs included; but NO relative clauses)
  – Could be imbricated ([[*the young lady’s mother*]])
Anaphoric (referential) relations

• coref
  
  [Ana] went to the church. [She] lighted a candle.

• member-of, has-as-member (inverse)
  
  Maria joined [[her] class] in a hurry.

• isa, class-of (inverse)

• part-of, has-as-part (inverse)
  
  Anatoliy shacked hands with Bob.

• subgroup-of, has-as-subgroup (inverse)

• has-name, name-of (inverse)
Kinship relations

• *parent-of, child-of* (inverse)
• *grandparent-of, grandchild-of* (inverse)
• *sibling* (symmetrical)
• *ant-uncle-of, nephew-of* (inverse relations)
• *cousin-of* (symmetrical)
• *spouse-of* (symmetrical)
• *unknown*
Affective relations

- *friend-of, enemy-of* (inverse)
- *love, hate* (inverse)
- *has-fear-of*
- *worship*
Social relations

• *inferior-of, superior-of* (inverse)
• *colleague-with*
Petronius...  

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Petronius

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Petronius...

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.
Referential relations: coref

Petronius...

Vinicius was

the son of his oldest sister,

who years before had married his father,

a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Referential relations: class-of

Petronius...

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Kinship relations: sibling

Petronius...

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Kinship relations: child-of

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.
Kinship relations: parent-of

Petronius...

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Kinship relations: **spouse-of**

Petronius...

Vinicius was the son of **his** oldest sister,

who years before had **married** **his** father,

a man of consular dignity from the time of **Tiberius**.

CHNU, Chernivtsi, 26 February 2014
Petronius...

Vinicius was the son of his oldest sister, who years before had married his father, a man of consular dignity from the time of Tiberius.

CHNU, Chernivtsi, 26 February 2014
Building the “Quo Vadis” corpus

Feb. – Jun. 2013
– annotators: 12 master students, first year in CL
– no programmers

– annotators: 3 master students second year in CL (experts)
– programmers: 1 PhD student, 1 master student

<table>
<thead>
<tr>
<th></th>
<th>words</th>
<th>ent</th>
<th>ref</th>
<th>aff</th>
<th>kin</th>
<th>soc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun. 2013</td>
<td>25314</td>
<td>3663</td>
<td>2045</td>
<td>39</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>Feb. 2014</td>
<td>137510</td>
<td>20888</td>
<td>15578</td>
<td>368</td>
<td>168</td>
<td>494</td>
</tr>
</tbody>
</table>

CHNU, Chernivtsi, 26 February 2014
Marcus era fiul Vinicius.

surorii sale erau mai mari.

Care, cu ani în urmă, căsătorise cu acestia, tatăl acesteia, Tiberiu, consul pe vremea lui Tiberiu.

Aceasta, cu acesta, acesteia, consilier pe vremea acestuia.
Conclusions

• Research and teaching must go together
• As a professor-researcher you can do 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 in teaching
• Advance the SOTA in publications by iteratively enhancing student work at all levels

CHNU, Chernivtsi, 26 February 2014
My thanks go to YOU!
My research group

NLP-Group@INFO-UAIC

http://nlptools.infoiasi.ro/People.jsp

CHNU, Chernivtsi, 26 February 2014
Ph.D. thesis – past

- Adrian Iftene: *textual entailment with applications to Question Answering*
- Diana Trandabăţ: *semantic frames in NLP*
- Ionuţ Pistol: *NLP workflows*
- Alex Moruz: *predication driven textual entailment*
Ph.D. thesis – running

- Radu Simionescu: *grammars inferring techniques*
- Daniel Anechitei: *NLP technologies at the discourse level*
- Elena Mitocariu: *discourse structure and co-referentially*
- Mădălin Pătrașcu: *computational lexicography*
- Laura Pistol: *language models in processing Romanian speech*
- Paul Diac: *format-based configuration of NLP architectures*
- Daniela Gîfu: *affective analysis of texts*

CHNU, Chernivtsi, 26 February 2014
National and European projects – past

- See [http://nlptools.infoiasi.ro/Projects.jsp](http://nlptools.infoiasi.ro/Projects.jsp)