Something creative here

Prof. Hannu Toivonen

Discovery Group

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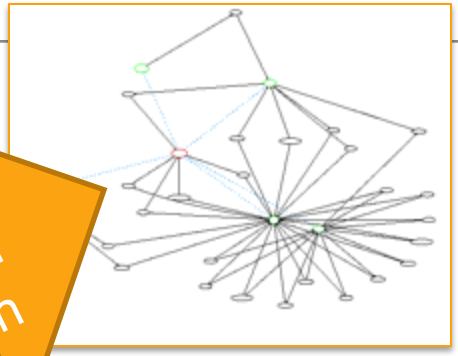
Discovery Group

- Prof. Hannu Toivonen
- Dr. Alessandro Valitutti (8/2011-)
- Laura Langohr, PhD student (7/2008-)
- Fang Zhou, PhD student (10/2008-9/2012)
- Esther Galbrun, PhD student (9/2010-; co-superv. with M. Koivisto)
- Oskar Gross, PhD student (~1/2012-)
- Jukka Toivanen, PhD student (~1/2012-)
- Joonas Paalasmaa, PhD student (9/2010-; employed by Finsor Ltd.)
- Maria-Eleni Skarkala, visiting PhD student (9/2011-3/2012)

Research topics

Creation of graphs

Search and discovery of information



Creative use of graphs

Creation of networks

Past:

- Integration and indexing of heterogeneous biological data sources (Biomine)
- [under revision for BMC Bioinformatics]

On-going:

- Derivation of term relationships from document collections
- [to be submitted to Computer Journal]

Search and discovery of information in networks

Past and on-going work:

- How to measure long-range relationships?
- How to specify and execute queries?
- How to extract a small, informative subgraph?
- How to find few representative nodes?
- How to abstract a large/complex graph?
- Visualization and user interfaces
- [ICCC 2010, ICDM 2010, IDA 2010, PAKDD 2010, ASONAM 2010, KDD 2011, BMC Bioinformatics 2011, ACM SAC 2012, submissions to SDM, PAKDD, BMC Bioinformatics]
- PhD's of Petteri (2011), Lauri, Fang, and Laura (2012)

Creative use of networks

New work, just started:

- Computer poetry, in Finnish (Jukka)
- Automatic mind map generation (Oskar)
- Computational humor (Alessandro)
- …and more to come

And some other topics as well…

- Redescription mining (Esther)
- Heart rate and sleep analysis (Joonas)
- Privacy preserving graph mining (Maria)

Computational poetry

Our goal is to generate novel poetry with

- control over topics
- control over surface poetic features (meter, rhyme…)
- semantic coherence
- grammatical correctness

Major issues, especially with semantics and grammar

We also prefer to minize language dependency

Semantic issues in poetry generation

- Semantic coherence and control over topics
  - Achieved using a simple semantic network
  - Construct poetry using words related to given topics
  - The network is constructed from term co-occurrences in a background corpus
  - The background corpus is not assumed to be poetic

Grammatical issues in poetry generation

- Producing grammatically correct poetry
  - Instance (example) based approach using a corpus
    - Instead of an explicitly represented generative grammar
  - Generate a new poem by copying a sentence (or verse) from the corpus
  - Especially, copy the syntax and morphology
  - Replace (some of) the contents by words related to the given topic
  - The corpus used here can be poetic or not

Algorithm outline

Input:

- a semantic network *S* constructed from a background corpus
- a grammar corpus *G*
- topic *t* (a node in *S*) of the poem
- the desired rhythm, rhyme, and alliteration

Method:

- randomly pick a text *p* from the grammar corpus *G*
- for each word *w* in *p*, replace *w* by *w'* such that:
  - *w'* is related to topit *t* in the semantic network *S*
  - *w'* matches *w* grammatically (POS) and morphologically (case, singular/plural, person, clitics…)
  - *p* should, in the end, have the desired rhythm, rhyme, and alliteration

Output: poem *p*

Examples of computer poetry

- Poems inspired by the recent financial events and negotiations concerning Greece and Euro

- In Finnish, sorry!

”Jyrki boy”

Kuinka hän leikki silloin
uskaliaassa, uskaliaassa kuiskeessa
vaaleiden puiden alla.
Hän oli kuullut huvikseen
kuinka hänen kuiskeensa kanteli helkkeinä tuuloseen.

Original poem

kuinka hän leikki kerran
suuressa vihreässä puistossa
ihanien puiden alla.
Hän oli katsellut huvikseen,
kuinka hänen hymynsä putosi kukkina maahan

”Evening prayer of Jutta Urpilainen”

Lepää tuskat sentään.
Lennä, lennä, lennä
aatos inehmon!
Mennä, mennä, mennä
aika maata on.

Is actually part of Iltarukous by Eino Leino

Lepää tuskat sentään.
Lennä, lennä, lennä
aatos inehmon!
Mennä, mennä, mennä
aika maata on.

”Ode to markka by (True) Finns”

Markka saa kunnian ollen.
Saa minun kunniani lämpö,
markassani on kevään veri.
Maksa käteni, valkoinen käsivarteni,
maksa kapeitten olkapäitteni kaipaus.

Original poem

Päivä viilenee illan tullen.
Juo minun käteni lämpö,
kädessäni on kevään veri.
Ota käteni, valkoinen käsivarteni,
ota kapeitten olkapäitteni kaipaus.

”Center party pastoral”

Sirota kasket sentään.
Sirota, teurasta, rutista
aatos siemenen!
Rutistaa, teurastaa, mennä
aika piillä on.

Original poem, part of Iltarukous by Eino Leino

Lepää tuskat sentään.
Lennä, lennä, lennä
aatos inehmon!
Mennä, mennä, mennä
aika maata on.

Conclusions

- Research related to networks
- Application focus moved from bioinformatics to creativity
- Several new efforts being set up in computational creativity