

**The Scientific Report**  
of

**Research Work**  
[05.01.2012 -04.01.2013]

done by

**Dr. AMITAVA DAS**  
**ERCIM Fellow [2012 - 2013]**



at  
**IDI, NTNU**  
Norway

under  
The ERCIM "Alain Bensoussan" Fellowship Programme

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## The Scientific Report of Work done

[From 05.01.2012 to 04.01.2013]

Fellow: **Dr. AMITAVA DAS**  
ERCIM Fellow (2012 - 2013)

Host: **Björn Gambäck**  
Professor, IDI, NTNU

Place: Department of Computer and Information Science (IDI)  
Norwegian University of Science and Technology (NTNU)  
Sem Sælands Vei 7-9, NO - 7491, Trondheim, Norway

Period of Stay: 05.01.2012 - 04.01.2013

### Scientific Activity:

During my 12 months stay at NTNU, I have been actively involved in research particularly on Sentiment Analysis from text and Natural Language Processing.

Research Application Area

- Vector Spaced Representation of Sentiment Knowledge: Sentimantics
- Cross-lingual and Multi-Lingual Sentiment Analysis

### ***Vector Spaced Representation of Sentiment Knowledge: Sentimantics***

Sentiment Analysis research becomes quite mature after a few decades of cultivation, but still people have to rely on static sentiment lexicons, i.e., lexicons attached with proximity based fixed point prior polarities, typically positivity and negativity (Ex. “long” **positivity**: 0.50 **negativity**: 0.0). But according to best of our knowledge no previous research clarifies, and there is no clue in these lexical resources regarding, which value to select in what context? The general trend is to pick the highest one (i.e., if **positivity** > **negativity** then the positivity score otherwise the negativity score extracted), but which the correct one is may vary by context. To overcome the problems of the present proximity based static sentiment lexicon based techniques, a new paradigm has been tried to represent sentiment knowledge in a Vector Space Model (VSM). The proposed models can store dynamic prior polarity with its different contextual information (Ex. “long”, context: *waiting*, **polarity**: -0.25, or “long”, context: *live*, **polarity**: +0.50). During the tenure of the ERCIM fellowship, the fellow with the support of the hosting team has carried out research to represent the sentiment knowledge in the Conceptual Spaces of Distributional Semantics, a topic defined as Sentimantics.

## ***Cross-lingual and Multi-Lingual Sentiment Analysis & Sentiment Translation***

Every language has its own cultural and regional effects. As a result every language has numbers of culture specific sentiment concepts and metaphors. For example, in Norwegian:

Dugnad: The collective effort

Russ: Russefeiring activity by students

Bunad: Norg's traditional costume

Till date there is no relevant study regarding this. The purpose of the fellow's study has been:

1. To examine the inter-portability of sentimental concepts over multiple languages including Norwegian and German.
2. Develop a sentiment-sensitive Machine translation strategy for effectively translating sentimental phrases/sentences (specially metaphors) from one language to another.

## **Publications during the Fellowship:**

### ***Book Chapters***

1. **Amitava Das** and Björn Gambäck. "Opinion is the Medium between Knowledge and Ignorance: Bridging the Gap between Machine's Sentiment and Human Intelligence". In Nitin Agarwal, Rolf T. Wigand, and Merlyna Lim, editors, *Online Collective Action Dynamics of the Crowd in Social Media*. Number 4 in Springer Lecture Notes in Social Networks, Berlin Germany, 2013. Springer-Verlag (to appear).
2. **Amitava Das** and Björn Gambäck. "যন্ত্র-না (Jantra-Na: Not-Machine) Can only Feel যন্ত্রনা (Jantrana: Pain)!" In M.~A. Karim, M.~Kaykobad, and M.~Murshed, editors, *Technical Challenges and Design Issues in Bangla Language Processing*, pp. 328-345. Hershey, Pennsylvania, 2013. IGI Global, August 2013.

### ***Journals***

1. **Amitava Das** and Björn Gambäck. *Sentimantics: Dynamic Sentiment Knowledge Representation*. IEEE Computational Intelligence Magazine special issue on 'Computational Intelligence for Natural Language Processing' (submitted).

### ***Conference/Workshops***

1. B.G. Patra, K. Debbarma, S. Debbarma, D. Das, A. Das and S. Bandyopadhyay. *A Light Weight Stemmer in Kokborok*. In the Proceeding of the 24<sup>th</sup> ROCLING Conference (ROCLING 2012), September 21-22, 2012, Chung-Li, Taiwan.
2. **Amitava Das** and Björn Gambäck. *Exploiting 5W Annotations for Opinion Tracking*. In the Proceeding of the Workshop on Exploiting Semantic Annotations in Information Retrieval (ESAIR), CIKM 2012, October, Maui, Hawaii.
3. **Amitava Das** and Björn Gambäck. *Sentimantics: The Conceptual Spaces for Lexical*

*Sentiment Polarity Representation with Contextuality*. In the 3<sup>rd</sup> Workshop on Computational Approaches to Subjectivity and Sentiment Analysis (WASSA), ACL 2012, Pages 38-46, July, 2012, Jeju, South Korea.

4. **Amitava Das** Sivaji Bandyopadhyay and Björn Gambäck. *Sentiment Analysis: What is the End User's Requirement?* In the Proceeding of the International Conference on Web Intelligence, Mining and Semantics (WIMS 12), Pages 1-10, June 13-15, 2012, Craiova, Romania.
5. **Amitava Das**, Sivaji Bandyopadhyay and Björn Gambäck. *The 5W Structure for Sentiment Summarization-Visualization-Tracking*. In the Proceeding of the 13<sup>th</sup> International Conference on Intelligent Text Processing and Computational Linguistics (CICLING 2012), pages 540-555, March, 2012, Delhi, India.

## **Leadership and Organization**

### ***In Organizing Committee***

- ❖ The 3<sup>rd</sup> Workshop on South and South East Asian Natural Language Processing (WSSANLP), COLING 2012, December 8<sup>th</sup>, Mumbai, India.
- ❖ The 2<sup>nd</sup> Workshop on Sentiment Analysis where AI Meets Psychology (SAAIP), COLING 2012, December 15<sup>th</sup> Mumbai, India.
- ❖ Brain Inspired Opinion Mining and Sentiment Analysis (BIOMSA)-collocated with the 11<sup>th</sup> IEEE International Conference on Cognitive Informatics & Cognitive Computing (ICCI\*CC), August 22-24, 2012.
- ❖ Sentiment Analysis for Asian Languages (SAAL 2012)-collocated with The 25<sup>th</sup> International Conference on Industrial, Engineering & Other Applications of Applied Intelligent Systems 2012 (IEA-AIE), June 9-12, 2012, Dalian, China.

### ***In Program Committee***

- ❖ 24<sup>th</sup> International Conference on Computational Linguistics (COLING 2012), December, Mumbai, India.
- ❖ IEEE-ICDM Workshop on Sentiment Elicitation from Natural Text for Information Retrieval and Extraction 2012, December, Brussels, Belgium.
- ❖ Workshop on Intelligent Approaches to Sentiment Mining and Emotion Analysis

(WISMEA), SBIA 2012, October, 2012, Curitiba, Paraná, Brazil.

- ❖ ACM KDD Workshop on Issues of Sentiment Discovery and Opinion Mining (WISDOM), August 2012, Beijing, China.

## **ERCIM-RESEARCH EXCHANGE PROGRAMME (REP) (12 months scheme)**

### ***1<sup>st</sup> Visit***

**Organization:** Swedish Institute of Computer Science (SICS)

**Duration:** 1<sup>st</sup> May-6<sup>th</sup> May, 2012

**Meet with:** Dr. Anders Holst, Oscar Täckström and the text analytics researchers at SICS.

**Activities:** **Invited Talk:** *Sentiment Analysis...the new Horizon*

**Research Exchanges:** Exchanged ideas on various inter-disciplinary fields.

### ***2<sup>nd</sup> Visit***

**Organization:** University of Copenhagen, Copenhagen Business School

**Duration:** 18<sup>th</sup> Nov-21<sup>st</sup> Nov, 2012

**Meet with:** Prof. Michael Carl

**Activities:** **Invited Talk:** *Sentiment...Human Intelligence*

**Research Exchanges:** Eye-Tracking and Sentiment Analysis

## **Non-ERCIM Research Exchange Visit**

**Organization:** Gavagai AB (<http://www.gavagai.se/>), a SICS spin-off company.

**Duration:** 7<sup>th</sup> May, 2012

**Meet with:** Prof. Jussi Karlgren, Dr. Magnus Sahlgren, and Dr. Fredrik Olsson.

**Activities:** **Invited Talk:** *Sentiment...Human Intelligence*

**Research Exchanges:** To learn about entrepreneurship along with the scientific knowledge exchange.

**Organization:** Uppsala University

**Duration:** 8<sup>th</sup> May-9<sup>th</sup> May, 2012

**Meet with:** Prof. Joakim Nivre, Department of Linguistics and Philology

**Activities:** **Research Exchanges:** Discussed on dependency parsing and Machine Translation systems.