



Conference Brochure

ICCC 2014

5th International Conference on
Computational Creativity
Ljubljana, Slovenia, June 10-13, 2014



Editors:

Simon Colton
Michael Cook
Nada Lavrač
Dan Ventura

The Fifth International Conference on Computational Creativity

ICCC 2014

June 9-13, 2014
Ljubljana, Slovenia

<http://computationalcreativity.net/iccc2014/>

CONTENTS

WELCOME	2
WITH MANY THANKS	3
INFORMATION FOR PARTICIPANTS AND PRESENTERS	4
CONFERENCE AT-A-GLANCE	5
SOCIAL EVENTS.....	6
THE CONFERENCE TOWN: LJUBLJANA, SLOVENIA.....	8
OTHER USEFUL INFORMATION	9
DETAILED PROGRAM – MONDAY AND TUESDAY	11
DETAILED PROGRAM – WEDNESDAY	12
DETAILED PROGRAM – THURSDAY	13
DETAILED PROGRAM – FRIDAY	14
INVITED TALK	15
ART EXHIBITION – <i>YOU / ME / IT</i>	16
ABSTRACTS.....	17
COMMITTEES	32
USEFUL PHRASES IN SLOVENE	34
AUTHOR INDEX	35
MY NOTES.....	37

WELCOME

Welcome to Ljubljana and the Fifth International Conference on Computational Creativity!

Computational creativity is thriving, with the technical programme of this year's conference highlighting much progress in the state of the art across all aspects of the field. These aspects include: engineering and applying creative systems in the arts and sciences, music, literature, video games, culinary arts and elsewhere; formalising what it means for software to be creative and for progress in the field; relating Computational Creativity to other disciplines including psychology and philosophy; and engaging with audiences through our creative software.

We are looking forward to the best scientific programme in the history of the conference, with 36 technical papers and 15 late-breaking papers to be delivered over the next few days. Constructing this year's technical programme has been challenging. We received a record number of paper submissions and as a result, this year's conference represents the greatest number of papers accepted to date, as well as the lowest acceptance rate, which are good indicators that the conference is growing both in quality and quantity of work submitted. As a result, for the first time this year, the conference has been extended to a fourth day.

The conference is also continuing its tradition of strong international representation, with authors of accepted papers coming from Australia, Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Greece, Indonesia, Ireland, Italy, Japan, Malta, Mexico, Norway, Poland, Portugal, Slovenia, Spain, the United Kingdom and the United States. We have also expanded the scope to include five different paper types: technical papers, systems descriptions, study papers, cultural application papers and position papers, with each type well represented in the proceedings.

We are very pleased that Prof. Oliver Deussen of Konstanz University in Germany will deliver this year's keynote talk on "Non-photorealistic Rendering Getting Physical", where he will describe his own - and the graphics community's - involvement in the visual arts, with particular emphasis on his robot painter, e-David.

In addition to the technical programme, we're very pleased to welcome a number of co-located events, sponsored by the PROSECCO network for promoting Computational Creativity (www.prosecco-network.eu). Firstly, there will be a tutorial on the day preceding the conference which will cover both theoretical and practical aspects of the field, with a particular focus on writing Twitter bots. We also have a launch event planned at the welcome reception for Tony Veale's new book "Hand-Made By Machines: An Illustrated Guide to Creativity in Humans and Computers" (www.robotcomix.com).

For the duration of the conference, the Jožef Stefan Institute gallery will be hosting a special art exhibition entitled "You / Me / It" with international artists presenting their animation, video, game and augmented reality work in the context of a contact forum: the artists are interested in the scope and potential of Computational Creativity for their work. There will be a panel session with artists and Computational Creativity researchers on the first day of the conference, devoted to the broad topic of Computational Creativity and the Arts. We hope that this will provide a springboard for further conversations and engagement with the artists at the contact forum.

Finally, we are excited about spending time in beautiful Ljubljana, Slovenia. The local team have organised a series of great social activities including a welcome reception, guided tour of Ljubljana and conference banquet in the castle. With so many interesting papers, activities and networking opportunities, we hope that you enjoy the conference this year, and that you leave with new ideas, new contacts and the sense of excitement for the field that we all share.

Simon Colton, Michael Cook, Nada Lavrač and Dan Ventura
Conference Chairs

WITH MANY THANKS...

We are extremely grateful for the wonderful hospitality and huge amount of hard work undertaken by the local organizing team from the Jožef Stefan Institute, including Senja Pollak, Mili Bauer, Dragana Miljković and Tina Anžič. They have worked tirelessly to bring together all of the strands of the conference and co-located events, and gone beyond the call of duty to arrange for this to be a great conference. In addition, Tuula Juvonen in the Computational Creativity group at Goldsmiths College has worked hard to organise many aspects of the art exhibition, and we would like to thank her very much for this.

We would like to thank Oliver Deussen for agreeing to present a keynote talk at the conference. We would similarly like to thank the artists at the exhibition for agreeing to join the event, with special thanks to the curator and organiser of the exhibition, Ian Gouldstone, who, along with colleagues Phoenix Fry and Laura Bushell, has done a great job under difficult time constraints to organise and document the first co-located art exhibition at the conference. Similar thanks go to Tony Veale and Geraint Wiggins for organising the first tutorial session at the conference, and we hope this will be a feature of future events.

The conference would be nothing without the sterling efforts of the many authors who contributed papers containing great research, and we would like to thank both the authors whose papers were accepted, and those whose papers we were unfortunately not able to take. The reviewing process for this year's conference was very rigorous, with each paper getting three thorough reviews, equating to more than 60,000 words of feedback for the authors - an amazing statistic, which shows how engaged and encouraging the Computational Creativity community is.

We are extremely grateful to the programme committee members who undertook and organised these reviews: John Barnden, Oliver Bown, David C Brown, Nick Bryan-Kinns, Win Burleson, F. Amílcar Cardoso, John Gero, Pablo Gervás, Ashok Goel, Andrés Gómez de Silva Garza, Paulo Gomes, Jeremy Gow, Kazjon Grace, Amy Hoover, Anna Jordanous, Robert Keller, Ramon Lopez De Mantaras, Penousal Machado, Brian Magerko, Mary Lou Maher, Neil Maiden, Ruli Manurung, Jon McCormack, David C. Moffat, Nick Montfort, Diarmuid O'Donoghue, Francois Pachet, Philippe Pasquier, Alison Pease, Francisco Pereira, Rafael Pérez y Pérez, Mark Riedl, Graeme Ritchie, Rob Saunders, Gillian Smith, Ricardo Sosa, Oliviero Stock, Julian Togelius, Hannu Toivonen, Paulo Urbano, Lav Varshney, Tony Veale, Geraint Wiggins and Georgios Yannakakis.

In addition to the programme committee, we would like to pass on our thanks to the additional reviewers who devoted time and energy to the conference: Ricardo de Aldama, Ben Bogart, Charles Callaway, Fiammetta Ghedini, Carlos León, James Maxwell, Marco Marchini, Dragana Miljković, Hugo Gonçalo Oliveira, Senja Pollak and Jasmina Smailović. We would also like to thank the select band of people who helped out with reviewing the late breaking papers (not mentioned by name, to maintain anonymity).

As usual, the conference has been steered beautifully by the Association for Computational Creativity committee, to whom we are very grateful, with particular help from the organisers of the PROSECCO network. We are also very grateful for exposure of the conference from the Association for the Advancement of Artificial Intelligence. Finally, we would like to acknowledge with many thanks the financial support we received from the Jožef Stefan Institute, the EU FP7 programme via the PROSECCO network, the Office of Naval Research Global and the Engineering and Physical Sciences Research Council in the UK.

INFORMATION FOR PARTICIPANTS AND PRESENTERS

REGISTRATION

Registration starts on Tuesday, June 10 at 09:00.

REGISTRATION DESK WORKING HOURS:

Tuesday, June 10 09:00 – 20:00

Wednesday, June 11 09:00 – 18:00

Thursday, June 12 09:00 – 16:30

Friday, June 13 09:00 – 13:30

ENTRANCE TO THE CONFERENCE EVENTS:

Each participant will receive a name tag at registration. Please bring it with you to all conference events.

Additional tickets for accompanying persons to attend social events can be purchased at the registration desk.

INSTRUCTIONS FOR PRESENTERS

Presentations are available to be uploaded to the conference computer via CD or USB flash drives in the morning or in the break prior to the start of the session. Volunteers will be available to help, however, presenters are responsible for setting up their slides and making sure that the file opens correctly.

Please note that the computer in the conference hall runs Windows 7, Office 2010 and Acrobat reader with Windows 7, Office 2010 and the Acrobat reader. Participants can also use their own laptops.

PRESENTATION TIME:

Keynote presenter: 60 minutes, including discussion

Long papers: 20 minutes + 5 minutes for discussion

Late breaking papers: 10 minutes, including discussion

INTERNET

Free wireless internet connection is available in the conference room and in other public areas.

Username: guest ; Password: dearguest

CONFERENCE ROOM

Jožef Stefan Institute - Main lecture hall (1st floor)

Coffee breaks will be held in front of the main lecture hall.

Buffet lunches for all conference participants will be organized in the Gallery (ground floor).

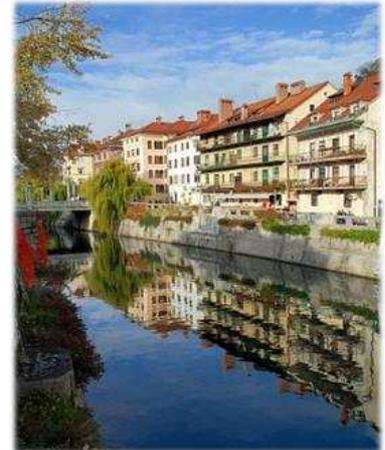
CONFERENCE AT-A-GLANCE

	Time	Session
Monday	14:30 - 17:30	Computational Creativity Tutorial
	18:00 - 21:00	Art exhibition opening
Tuesday	09:50 - 10:00	Conference opening
	10:00 - 11:15	Co-creation
	11:15 - 11:45	 Coffee break
	11:45 - 13:00	Visual Arts
	13:00 - 14:30	 Lunch
	14:30 - 15:30	Invited Talk – Oliver Deussen
	15:30 - 16:00	 Coffee break
	16:00 - 16:50	Videogames
	16:50 - 18:00	Panel session on Computational Creativity and the Arts
	18:30 - 19:00	Book Launch - Tony Veale
19:00 - 21:00	Welcome reception and <i>You / Me / It</i> art exhibition	
Wednesday	09:30 - 11:10	Poetry
	11:10 - 11:40	 Coffee break
	11:40 - 12:50	Music
	12:50 - 14:30	 Lunch
	14:30 - 16:10	Evaluation
	16:10 - 16:40	 Coffee break
16:40 - 17:55	Evaluation/Data	
Thursday	09:30 - 11:10	Language/Narrative #1
	11:10 - 11:40	 Coffee break
	11:40 - 13:20	Language/Narrative #2
	13:20 - 14:30	 Lunch
	14:30 - 15:45	High Level Issues
	15:45 - 16:35	Late Breaking Papers
	17:30 - 20:00	Guided tour of Ljubljana
20:00 - Late	Conference dinner	
Friday	09:30 - 11:10	Platforms/Frameworks
	11:10 - 11:40	 Coffee break
	11:40 - 13:00	Late Breaking Papers
	13:00 - 13:30	Closing remarks and announcements

SOCIAL EVENTS

WELCOME RECEPTION AND ART EXHIBITION – Tuesday, June 10th, 19:00

A welcome reception will be held in the Gallery of the Jožef Stefan Institute. You will be able to enjoy the You / Me / It art exhibition (see page 16), and delicious Slovenian finger food specialities.



The Welcome Reception for conference participants is included in the registration fee.

GUIDED TOUR AND CONFERENCE DINNER – Thursday, June 12th, 17:30

The guided tour will take you to some of the main sights of the beautiful city of Ljubljana. Ljubljana has preserved evidence of a five thousand year history including, among others, the remains of the Roman city of Emona and the old city centre with its medieval castle, baroque facades, decorative portals and uneven roofs. Other significant aspects of the city's mosaic include picturesque bridges across the Ljubljanica river. The Conference Dinner will follow in the restaurant of Ljubljana castle. This mighty medieval fortress, a symbol of the Slovenian capital Ljubljana, is a popular tourist point, the idyllic grounds for long strolls just a glance away from the lively city centre. The cuisine at the restaurant is influenced by the culinary crossroads of the Alps, the Adriatic and the Pannonia, guaranteeing the flavour of ancient times and an unforgettable gastronomic experience.



Itinerary:

- 17:15 Meet at the Prešeren Square in the city centre
- 17:30 Guided tour through the Old town
- 20:00 Conference dinner at Ljubljana castle
- 23:00 Last funicular train departs back to the city centre

The Guided tour and Conference Dinner are included in the registration fee. The registration fee for accompanying guests includes the guided tour, the funicular ride to Ljubljana castle and the conference dinner.

CONFERENCE LUNCHES – June 10-13

Lunches are included in the conference fee and will be served in the Gallery of the Jožef Stefan Institute. Your name tag is the official pass to the Gallery.

On Tuesday an open air lunch will be organized across the street: Teslova 30 (we will take you there after the lectures). In case of bad weather, it will be served in the Gallery.

COFFEE BREAKS – June 10-13

Refreshments will be served during coffee breaks (morning and afternoon) in front of the main lecture hall.

THE CONFERENCE TOWN: LJUBLJANA, SLOVENIA

BASIC INFORMATION

Ljubljana, the capital of Slovenia, is a central European city. It has all the facilities of a modern capital, and yet it has preserved its small-town friendliness and relaxed atmosphere. Ljubljana is a city with numerous green areas, which offer excellent opportunities for sports and recreation. The city, with 280,000 inhabitants is one of the smallest European capitals but it maintains the role of a capital and possesses all the characteristics of a metropolis.

Ljubljana is a city of culture. It is home to numerous theatres, museums and galleries, and boasts one of the oldest philharmonic orchestras in the world. The first impression a visitor gets of Ljubljana is that it is an exceptionally young city. It is home to over 50,000 students, who give it a special vibe. As four Slovene regions meet in Ljubljana, the city's numerous restaurants and inns offer a wide range of local delicacies and superb wines.

Jožef Stefan Institute, situated in Ljubljana, was founded in 1949. In terms of its activities and status, Jožef Stefan Institute is the main and largest (over 900 employees) national institute in natural sciences and technology, complementing the role of universities and bridging the gap between science and industry. The main research areas are information technologies, physics, chemistry, molecular biology and biotechnology, reactor physics and technology, energy and environment.



OTHER USEFUL INFORMATION

Conference location

Jožef Stefan Institute, Jamova 39, 1000 Ljubljana, Slovenia

Local transportation

Bus: If you wish to travel on Ljubljana city buses you should purchase the Urbana public transport card. It is available from LPP ticket offices, tourist information centres, city newspaper kiosks, news-stands and post offices. The card is priced at €2.00 and can store up to €50.00 of credit. Visitors who purchase their Urbana card from a Tourist Information Centre and keep the receipt can return the card to the place of purchase when they no longer need it and claim a €2.00 refund. A single journey fare is €1.20. It covers an up to 90-minute journey regardless of the number of buses needed to be changed to reach the destination.

Bike: Cycling is a great way to explore Ljubljana and just go with its flow. Bicycles, available from the Slovenian Tourist Information Centre, can be rented at very reasonable prices, plus you can get all the tourist information you need while picking up your bicycle. Renting prices: €2.00 for an up to two-hour rent period, €8.00 for a rent period from two hours to a full day.

Another option is Bicikelj self-service rent-a-bike system. You should subscribe in advance and buy the Urbana card, but after the first ride it is free for short trips. More info is available at <http://en.bicikelj.si>. Bicikelj stations are located every 300 to 500 metres, e.g. you can grab the bike across the street from the hotel SLON and arrive to Tržaška c. 37 (the nearest station to the ICCC site).

Taxi: In the centre of Ljubljana you can easily find a vacant taxi. Charges range between €0.80 and €1.50 for the starting fee and from €0.70 to €1.70 per kilometre. Charges are lower when taxis are ordered by phone. In any case, it is advisable to enquire about the fare before the ride.

Metro Taxi
Telephone: 080 11 90,
Mobile: + 386 41 240 200
<http://www.taximetro.si/>

Intertours Taxi
Telephone: 080 311 311,
Mobile: + 386 31 311 311
<http://www.taxi-intertours.si/>

Laguna Taxi
Telephone: 080 12 33,
Mobile: + 386 31 492-299
<http://www.taxi-laguna.com/>

Rondo Taxi
Telephone: 080 900 900,
Mobile: + 386 31 225 588
<http://www.taxi-rondo.si/>

Currency, Money and Banks

The official currency is the Euro. Non-cash payment with credit or debit cards is possible everywhere through POS terminals. Cards accepted for payment are

OTHER USEFUL INFORMATION

MasterCard, Maestro, Visa, Visa Electron, Amex. Banks (banka) are generally open Monday to Friday 8.30 AM - 5 PM (often with a break for lunch).

Medical help

Medical emergency: Dial 112

The emergency center is located at Klinični center, Urgenca (Bohoričeva ulica 4).

Barsos Medical Center (they speak English):

Address: Gregorčičeva 11 (8 AM -2 PM).

Phone: + 386 (1) 242 07 00.

Price 20-30 EUR/consultation.

For non-emergency cases visit Medical Center Zdravstveni dom Ljubljana - Vič:

Address: Šestova 10, 1000 Ljubljana.

Restaurants

Ljubljana and Central Slovenia are well known for their traditional hospitality and rich diversity of culinary offerings, including good organic food. The choice of international cuisine is also rich and diverse. Ljubljana's character is somewhat shaped by the city's proximity to the Mediterranean and the Balkans, whose cuisines, often fused with classic Slovenian fare, are very popular. The working hours of most restaurants are from 11 AM till 11PM.

Weather

In the past several years the weather conditions in June have been excellent, with the average temperatures in the range 22-25 °C.

DETAILED PROGRAM – MONDAY AND TUESDAY

	Time	Session
Monday, June 9, 2014	14:30 - 17:30	Computational Creativity Tutorial
	18:00 - 21:00	Art exhibition opening
	Time	Session
Tuesday, June 10, 2014	09:50 - 10:00	Conference opening
	10:00 - 11:15	Co-creation
	10:00 - 10:25	Anna Kantosalu, Jukka Toivanen, Hannu Toivonen and Ping Xiao: <i>From Isolation to Involvement: Adapting Machine Creativity Software to Support Human-Computer Co-Creation</i>
	10:25 - 10:50	Liane Gabora and Simon Tseng: <i>The Social Impact of Self-Regulation on the Evolution of Simple and Complex Creative Ideas</i>
	10:50 - 11:15	Robert Tubb and Simon Dixon: <i>Parameter Space Interaction from a Creative Systems Perspective</i>
	11:15 - 11:45	 Coffee break
	11:45 - 13:00	Visual Arts
	11:45 - 12:10	David Norton, Derrall Heath and Dan Ventura: <i>Autonomously Managing Competing Objectives to Improve the Creation and Curation of Artifacts</i>
	12:10 - 12:35	Tatsuo Unemi: <i>Automated Daily Production of Evolutionary Audio Visual Art – An Experimental Practice</i>
	12:35 - 13:00	Nicholas Davis, Yanna Popova, Ivan Sysoev, Chih-Pin Hsiao, Dingtian Zhang and Brian Magerko: <i>Building Artistic Computer Colleagues with an Enactive Model of Creativity</i>
	13:00 - 14:30	 Lunch
	14:30 - 15:30	Invited Talk – Oliver Deussen: <i>Non-photorealistic Rendering Getting Physical</i>
	15:30 - 16:00	 Coffee break
	16:00 - 16:50	Videogames
	16:00 - 16:25	Antonios Liapis, Georgios Yannakakis and Julian Togelius: <i>Computational Game Creativity</i>
	16:25 - 16:50	Michael Cook and Simon Colton: <i>Ludus Ex Machina: Building A 3D Game Designer That Competes Alongside Humans</i>
	16:50 - 18:00	Panel session on Computational Creativity and the Arts
18:30 - 19:00	Book launch by Tony Veale	
19:00 - 21:00	Welcome reception and You / Me / It art exhibition	

DETAILED PROGRAM – WEDNESDAY

	Time	Session
Wednesday, June 11, 2014	09:30 - 11:10	Poetry
	09:30 - 09:55	Jukka Toivanen, Oskar Gross and Hannu Toivonen: <i>The Officer Is Taller Than You, Who Race Yourself! Using Document Specific Word Associations in Poetry Generation</i>
	09:55 - 10:20	Hugo Gonçalo Oliveira, Raquel Hervás, Alberto Díaz and Pablo Gervás: <i>Adapting a Generic Platform for Poetry Generation to Produce Spanish Poems</i>
	10:20 - 10:45	Joanna Misztal and Bipin Indurkha: <i>Poetry generation system with an emotional personality</i>
	10:45 - 11:10	Fam Rashel and Ruli Manurung: <i>Pemuisi: A constraint satisfaction-based generator of topical Indonesian poetry</i>
	11:10 - 11:40	 Coffee break
	11:40 - 12:50	Music
	11:40 - 12:05	Daniel Johnson and Dan Ventura: <i>Musical Motif Discovery in Non-musical Media</i>
	12:05 - 12:30	François Pachet and Pierre Roy: <i>Non-Conformant Harmonization: The Real Book in the Style of Take 6</i>
	12:30 - 12:40	Anna Jordanous, Daniel Allington and Byron Dueck: <i>Using online networks to analyse the value of electronic music</i>
	12:40 - 12:50	Maria Navarro, Juan Manuel Corchado and Yves Demazeau: <i>A Musical Composition Application Based on a Multiagent System to Assist Novice Composers</i>
	12:50 - 14:30	 Lunch
	14:30 - 16:10	Evaluation
	14:30 - 14:55	Oliver Bown: <i>Empirically Grounding the Evaluation of Creative Systems: An Interaction Design Approach</i>
	14:55 - 15:20	Kazjon Grace and Mary Lou Maher: <i>What to expect when you're expecting: The role of unexpectedness in computationally evaluating creativity</i>
	15:20 - 15:45	Anna Jordanous: <i>Stepping Back to Progress Forwards: Setting Standards for Meta-Evaluation of Computational Creativity</i>
	15:45 - 16:10	Simon Colton, Alison Pease, Joe Corneli and Michael Cook: <i>Assessing Progress in Building Autonomously Creative Systems</i>
	16:10 - 16:40	 Coffee break
	16:40 - 17:55	Evaluation/Data
	16:40 - 17:05	Diarmuid O'Donoghue: <i>Can a Computationally Creative System Create Itself? Creative Artefacts and Creative Processes</i>
17:05 - 17:30	Horacio Saggion and Francesco Barbieri: <i>Automatic Detection of Irony and Humour in Twitter</i>	
17:30 - 17:55	Babak Saleh, Kanako Abe and Ahmed Elgammal: <i>Knowledge Discovery of Artistic Influences: A Metric Learning Approach</i>	

DETAILED PROGRAM – THURSDAY

Time	Session
09:30 - 11:10	Language/Narrative #1
09:30 - 09:55	Michael Smith, Ryan Hintze and Dan Ventura: <i>Nehovah: A Neologism Creator Nomen Ipsum</i>
09:55 - 10:20	Pablo Gervás and Carlos León: <i>Reading and Writing as a Creative Cycle: The Need for a Computational Model</i>
10:20 - 10:45	Iván Guerrero Román and Rafael Pérez y Pérez: <i>Social Mexica: A computer model for social norms in narratives</i>
10:45 - 11:10	Carlos León and Pablo Gervás: <i>Creativity in Story Generation From the Ground Up: Non-deterministic Simulation driven by Narrative</i>
11:10 - 11:40	 Coffee break
11:40 - 13:20	Language/Narrative #2
11:40 - 12:05	Maria Teresa Llano, Rose Hepworth, Simon Colton, Jeremy Gow, John Charnley, Nada Lavrač, Martin Žnidaršič, Matic Perovšek, Mark Granroth-Wilding and Stephen Clark: <i>Baseline Methods for Automated Fictional Ideation</i>
12:05 - 12:30	Rafael Pérez y Pérez: <i>The Three Layers Evaluation Model for Computer-Generated Plots</i>
12:30 - 12:55	Amitava Das and Björn Gambäck: <i>Poetic Machine: Computational Creativity for Automatic Poetry Generation in Bengali</i>
12:55 - 13:20	Tony Veale: <i>Coming Good and Breaking Bad: Generating Transformative Character Arcs For Use in Compelling Stories</i>
13:20 - 14:30	 Lunch
14:30 - 15:45	High Level Issues
14:30 - 14:55	Oliver Bown: <i>A Model of Runaway Evolution of Creative Domains</i>
14:55 - 15:20	Stephen McGregor, Geraint Wiggins and Matthew Purver: <i>Computational Creativity: A Philosophical Approach, and an Approach to Philosophy</i>
15:20 - 15:45	Colin Johnson: <i>Is it Time for Computational Creativity to Grow Up and start being Irresponsible?</i>
15:45 - 16:35	Late Breaking Papers
15:45 - 15:55	D.P. O'Donoghue, H Saggion, D. Hurley, Y. Abgaz, F. Dong, X. Zheng, O. Corcho, J.J. Zhang, J-M Careil, B. Mahdian, X. Zhao: <i>Promoting Scientific Creativity with Dr. Inventor</i>
15:55 - 16:05	Agnese Augello, Ignazio Infantino, Giovanni Pilato, Riccardo Rizzo and Filippo Vella: <i>Combining Representational Domains for Computational Creativity</i>
16:05 - 16:15	Anhong Zhang and Rob Saunders: <i>Exploring Conceptual Space in Language Games Using Hedonic Function</i>
16:15 - 16:25	Santiago Negrete-Yankelevich and Nora Morales: <i>The apprentice framework: planning and assessing creativity</i>
16:25 - 16:35	Wendy Aguilar and Rafael Pérez y Pérez: <i>Criteria for Evaluating Early Creative Behavior in Computational Agents</i>
17:30 - 20:00	Guided tour of Ljubljana
20:00 - Late	Conference dinner

Thursday, June 12, 2014

DETAILED PROGRAM – FRIDAY

	Time	Session
Friday, June 13, 2014	09:30 - 11:10	Platforms/Frameworks
	09:30 - 09:55	Marco Schorlemmer, Alan Smail, Kai-Uwe Kühnberger, Oliver Kutz, Simon Colton, Emiliós Cambouropoulos and Alison Pease: <i>COINVENT: Towards a Computational Concept Invention Theory</i>
	09:55 - 10:20	Oliver Kutz, Till Mossakowski, Fabian Neuhaus and Mihai Codescu: <i>Blending in the Hub: Towards a collaborative concept invention platform</i>
	10:20 - 10:45	Antonio Chella, Salvatore Gaglio, Gianluigi Oliveri, Agnese Augello and Giovanni Pilato: <i>Creativity in Conceptual Space</i>
	10:45 - 11:10	John Chamley, Simon Colton and Maria Teresa Llano: <i>The FloWr Framework: Automated Flowchart Construction, Optimisation and Alteration for Creative Systems</i>
	11:10 - 11:40	 Coffee break
	11:40 - 13:00	Late Breaking Papers
	11:40 - 11:50	Nan Shao, Pavankumar Murali and Anshul Sheopuri: <i>New Developments in Culinary Computational Creativity</i>
	11:50 - 12:00	Ashish Jagmohan, Ying Li, Nan Shao, Anshul Sheopuri, Dashun Wang, Lav Varshney and Pu Huang: <i>Exploring Application Domains for Computational Creativity</i>
	12:00 - 12:10	Andrés Gómez de Silva Garza and Rafael Pérez y Pérez: <i>Towards Evolutionary Story Generation</i>
	12:10 - 12:20	Oskar Gross, Jukka M. Toivanen, Sandra Lääne and Hannu Toivonen: <i>Arts, News, and Poetry - The Art of Framing</i>
	12:20 - 12:30	Polona Tomašič, Martin Žnidaršič and Gregor Papa: <i>Implementation of a Slogan Generator</i>
	12:30 - 12:40	Tom De Smedt, Lucas Nijs and Walter Daelemans: <i>Creative Web Services with Pattern</i>
	12:40 - 12:50	Ivan Manuel Laclaustra, José Luis Ledesma, Gonzalo Mendez and Pablo Gervás: <i>Kill the Dragon and Rescue the Princess: Designing a Plan-Based Multi-agent Story Generator</i>
	12:50 - 13:00	Simon Colton and Dan Ventura: <i>You Can't Know my Mind: A Festival of Computational Creativity</i>
13:00 - 13:30	Closing remarks and announcements	

INVITED TALK

Prof. Oliver Deussen (Konstanz University, Germany)

Title: *Non-photorealistic Rendering Getting Physical*



Tuesday, June 10, 14:30 – 15:30

Computer graphics traditionally focusses on creating photorealistic images. However, for more than 20 years, computer graphics researchers have also worked on creating abstract visual representations. In my talk, I will give an overview of our research in this field. I will show how we apply such techniques in different fields ranging from landscape visualization to CAD. I will describe the projects related to our painting robot e-David, which is the basis from which we study human and machine painting. Using this machine, we create paintings with different media and in different styles completely automatically using a simple visual feedback loop. I will discuss the role of creativity in this process and how we want to incorporate artistic freedom and higher-order styles in the future.

TUTORIAL

A flavour of Computational Creativity (CC) research will be provided by an introductory tutorial from Geraint Wiggins and Tony Veale. The tutorial is open to all, and though new researchers may find it especially useful, it should contain something for everyone. For the tutorial will explore both sides of the CC coin, from the philosophical questions that we CC researchers frequently debate to the build-first-and-ask-questions-later approach of CC engineers. As a field CC embraces both kinds of approach and encourages researchers to develop both sides of their work. The tutorial opens with an introduction to the key philosophical issues in the field by Geraint Wiggins, and continues with a technical exploration into the anatomy of a creative Twitterbot by Tony Veale. The tutorial is sponsored by the PROSECCO European coordination action on Computational Creativity, and PROSECCO will fund 5 travel scholarships for students to attend the tutorial and the ICC-2014 conference. Check out <http://www.prosecco-network.eu/> for more details.

BOOK LAUNCH

"Hand-Made By Machines: An Illustrated Guide to Creativity in Humans and Computers" is a new illustrated text-book on Computational Creativity that is aimed at students and newcomers to the field. The e-book, which is free to read on the Web as part of the new CC-oriented Web-site RobotComix.com, has been written by Tony Veale but is designed to grow dynamically and incorporate contributions from other CC researchers about their specialist areas of CC research. Hand-Made By Machines is being launched at ICC-2014 as part of the PROSECCO European coordination action on Computational Creativity, and since the book will grow dynamically on the Web to reflect the needs of the whole CC community (i.e. you!) please bookmark <http://robotcomix.com/comix/Catalogue/mobile/> and <http://www.prosecco-network.eu/> and send us your recommendations for new topics and content.

ART EXHIBITION – YOU / ME / IT

The time when machines could only give answers and never ask questions is coming to an end and giving rise to new creative collaborations between people and machines. This exhibition of digital artworks by European artists surveys a number of these new collaborative methods and contemplates the philosophical, artistic and practical questions that surround existing and future possibilities of machine creativity.

Each of the exhibited works find their own balance of process and spectacle. In each case, the act of making the final artefact is accomplished by a non-human agent, while the meaning of the work often hides in the complexity that goes into achieving that automated act.

With artists like Robert Seidel and Gibson / Martelli, there is an emphasis on the spectacle of a final form where generated computer imagery is displayed in unique realworld spaces. Conversely, Félicien Goguey and Benjamin Barholet inherit a digital system's existing aesthetic, appropriating tools from the indie videogame Minecraft to recreate and remediate the iconic imagery of 2001: A Space Odyssey. In the work of Nicolai Troshinsky and Ed Key and David Kanaga, the computer acts as a space itself which an audience can navigate in realtime. This immersive staging gives the viewer the ability to explore the nonlinear yet narrative potential of generative art. No two play sessions are the same. Generative art often takes the simulation of nature as its subject, but it can also give rise to new singular forms. Tanja Vujinovic's work explores serialised forms, variations on a theme that can then be interpreted by an external agent. The computer generates variations with a set of parameters, allowing the artist to intervene through the sorting, editing and curation of these serialised works.

The exhibition runs from 10th to 13th June in the Jožef Stefan Institute gallery and has been sponsored as part of a Contact Forum by the PROSECCO network.

Participating Artists

Félicien Goguey & Benjamin Barholet, France (felicien.io)

Ed Key & David Kanaga, UK & USA (<http://www.visitproteus.com/>)

Gibson / Martelli, UK (<http://www.igloo.org.uk/>)

Robert Seidel, Germany (<http://2minds.de/>)

Nicolai Troshinsky, Spain (<http://www.troshinsky.com/>)

Tanja Vujinovic, Slovenia (ultramono.org)

ABSTRACTS**CO-CREATION****Session chair: F. Amílcar Cardoso****Anna Kantosalo, Jukka Toivanen, Hannu Toivonen and Ping Xiao**

From Isolation to Involvement: Adapting Machine Creativity Software to Support Human-Computer Co-Creation

This paper investigates how to transform machine creativity systems into interactive tools that support human-computer co-creation. We use three case studies to identify common issues in this transformation, under the perspective of User-Centered Design. We also analyse the interactivity and creative behavior of the three platforms in terms of Wiggins' formalization of creativity as a search. We arrive at the conclusion that adapting creative software for supporting human-computer co-creation requires redesigning some major aspects of the software, which guides our on-going project of building an interactive poetry composition tool.

Liane Gabora and Simon Tseng

The Social Impact of Self-Regulation on the Evolution of Simple and Complex Creative Ideas

Since creative individuals invest in unproven ideas at the expense of propagating proven ones, excess creativity can be detrimental to society; moreover, some individuals benefit from creativity without being creative themselves by copying creators. This paper builds on previous studies of how societies evolve faster by tempering the novelty-generating effects of creativity with the novelty-preserving effects of imitation. It was hypothesized that (1) this balance can be achieved through self-regulation (SR) of creativity, by varying how creative one is according to the value of one's creative outputs, and (2) that the social benefit of SR is affected by the openness of the space of possible ideas. These hypotheses were tested using EVOC, an agent-based model of cultural evolution in which each agent self-regulated its invention-to-imitation ratio as a function of the fitness of its inventions. We compared SR to non-SR societies, and compared societies in which the space of possible ideas was open-ended because agents could chain simple ideas into complex ones, to societies without chaining, for which the space of possible ideas was fixed. Agents in SR societies gradually segregated into creators and imitators, and changes in diversity were rapider and more pronounced than non-SR. The mean fitness of ideas was higher in SR than non-SR societies, but this difference was temporary without chaining whereas it was permanent with chaining. We discuss limitations of the model and possible social implications of the results.

Robert Tubb and Simon Dixon

Parameter Space Interaction from a Creative Systems Perspective

This paper proposes a new theoretical model for the design of creativity-enhancing interfaces. The combination of user and content creation software is looked at as a creative system, and we tackle the question of how best to design the interface to utilise the abilities of both the computer and the brain. This model has been developed in the context of music technology, but may apply to any situation in which a large number of feature parameters must be adjusted to achieve a creative result. The model of creativity inspiring this approach is Wiggins' Creative Systems Framework. Two further theories from cognitive psychology motivate the model: the notion of creativity being composed of divergent and convergent thought processes, and the "dual process" theory of implicit vs. explicit thought. These two axes are combined to describe four different

solution space traversal strategies. The majority of computer interfaces provide separate parameters, altered sequentially. This theory predicts that these one- to-one mappings encourage a particular navigation strategy ("Explicit-Convergent") and as such may inhibit certain aspects of creativity.

VISUAL ARTS

Session chair: Penousal Machado

David Norton, Derrall Heath and Dan Ventura

Autonomously Managing Competing Objectives to Improve the Creation and Curation of Artifacts

DARCI (Digital ARTist Communicating Intention) is a creative system that we are developing to explore the bounds of computational creativity within the domain of visual art. As with many creative systems, as we increase the autonomy of DARCI, the quality of the artifacts it creates and then curates decreases—a phenomenon Colton and Wiggins have termed the latent heat effect. We present two new metrics that DARCI uses to evolve and curate renderings of images that convey target adjectives without completely obfuscating the original image. We show how we balance the two metrics and then explore various ways of combining them to autonomously yield images that arguably succeed at this task.

Tatsuo Unemi

Automated Daily Production of Evolutionary Audio Visual Art – An Experimental Practice

Evolutionary computing based on computational aesthetic measure as fitness criteria is one of the possible methods to let the machine make art. The author developed and set up a computer system that produces ten short animations consisting sequences of abstract images and sound effects everyday. The produced pieces are published on the internet using three methods, movie files, HTML5 + WebGL, and a special application software. The latter two methods provide viewers experiences of a high resolution lossless animation. Their digest versions are also uploaded on a popular web service of movie sharing. It started October 2011. It is still in an experimental level that we need to brush up, but it has not always but often succeeded to engage the viewers.

Nicholas Davis, Yanna Popova, Ivan Sysoev, Chih-Pin Hsiao, Dingtian Zhang and Brian Magerko

Building Artistic Computer Colleagues with an Enactive Model of Creativity

This paper reports on the theory, design, and implementation of an artistic computer colleague that improvises and collaborates with human users in real-time. Our system, Drawing Apprentice, is based on existing theories of art, creative cognition, and collaboration synthesized into an enactive model of creativity. The implementation details of the Drawing Apprentice are provided along with early collaborative artwork created with the system. We present the enactive model of creativity as a potential theoretical framework for designing creative systems involving continuous improvisational collaboration between a human and computer.

VIDEOGAMES

Session chair: Brian Magerko

Antonios Liapis, Georgios Yannakakis and Julian Togelius

Computational Game Creativity

Computational creativity has traditionally relied on well-controlled, single-faceted and established domains such as visual art, narrative and audio. On the other hand, research on autonomous generation methods for game artifacts has not yet considered the creative capacity of those methods. In this paper we position computer games as the ideal application domain for computational creativity for the unique features they offer: being highly interactive, dynamic and content-intensive software applications. Their multifaceted nature is key in our argumentation as the successful orchestration of different art domains (such as visual art, audio and level architecture) with game mechanics design is a grand challenge for the study of computational creativity in this multidisciplinary domain. Computer games not only challenge computational creativity and provide a creative sandbox for advancing the field but they also offer an opportunity for computational creativity methods to be extensively assessed (via a huge population of gamers) through commercial-standard products of high impact and financial value.

Michael Cook and Simon Colton

Ludus Ex Machina: Building A 3D Game Designer That Competes Alongside Humans

We describe ANGELINA-5, software capable of creating simple three-dimensional games autonomously. To the best of our knowledge, this is the first system which creates complete games in 3D. We summarise the history of the ANGELINA project so far, describe the architecture of the latest version, and give details of its participation in Ludum Dare, a game design competition. This is the first time that a piece of software has entered a videogame design contest for human designers, and represents a step forward for automated videogame design and computational creativity.

POETRY

Session chair: François Pachet

Jukka Toivanen, Oskar Gross and Hannu Toivonen

The Officer Is Taller Than You, Who Race Yourself! Using Document Specific Word Associations in Poetry Generation

We propose a method for automatic poetry composition with a given document as inspiration. The poems generated are not limited to the topic of the document. They expand the topic or even put it in a new light. This capability is enabled by first detecting significant word associations that are unique to the document and then using them as the key lexicon for poetry composition.

Hugo Gonçalo Oliveira, Raquel Hervás, Alberto Díaz and Pablo Gervás

Adapting a Generic Platform for Poetry Generation to Produce Spanish Poems

PoeTryMe was created as a generic system for the generation of poetry that takes into account both semantics, in the form of triplets of relations between concepts, and textual structure, in the form of a grammar of templates extracted from existing poems. It was originally instantiated to

ABSTRACTS

generate poetry in Portuguese. The present paper describes an effort to create a different instantiation of PoeTryMe, this time focused on the production of poems in Spanish. The instantiation effort involved the creation of a set of triplets of relations to represent the semantics of Spanish terms, the extraction of a grammar of templates for Spanish from a corpus of Spanish poetry, the application of a different tool for Spanish syllabic division, the integration of the various modules, and several experiments with the resulting system.

Joanna Misztal and Bipin Indurkha

Poetry generation system with an emotional personality

We introduce a multiagent blackboard system for poetry generation with a special focus on emotional modelling. The emotional content is extracted from text, particularly blog posts, and is used as inspiration for generating poems. Our main objective is to create a system with an empathic emotional personality that would change its mood according to the affective content of the text, and express its feelings in the form of a poem. We describe here the system structure including experts with distinct roles in the process, and explain how they cooperate within the blackboard model by presenting an illustrative example of generation process. The system is evaluated considering the final outputs and the generation process. This computational creativity tool can be extended by incorporating new experts into the blackboard model, and used as an artistic enrichment of blogs.

Fam Rashel and Ruli Manurung

Pemuisi: A constraint satisfaction-based generator of topical Indonesian poetry

Pemuisi is a poetry generation system that generates topical poems in Indonesian using a constraint satisfaction approach. It scans popular news websites for articles and extracts relevant keywords that are combined with various language resources such as templates and other slot fillers into lines of poetry. It then composes poems from these lines by satisfying a set of given constraints. A Turing Test-style evaluation and a detailed evaluation of three different configurations of the system was conducted through an online questionnaire with 180 respondents. The results showed that under the best scenario, 57% of the respondents thought that the generated poems were authored by humans, and that poems generated using the full set of constraints consistently measured better on all aspects than those generated using the other two configurations. The system is now available online as a web application.

MUSIC

Session chair: Geraint Wiggins

Daniel Johnson and Dan Ventura

Musical Motif Discovery in Non-musical Media

Many music composition algorithms attempt to compose music in a particular style. The resulting music is often impressive and indistinguishable from the style of the training data, but it tends to lack significant innovation. In an effort to increase innovation in the selection of pitches and rhythms, we present a system that discovers musical motifs by coupling machine learning techniques with an inspirational component. Unlike many generative models, the inspirational component allows the composition process to originate outside of what is learned from the training data. Candidate motifs are extracted from non-musical media such as images and audio. Machine learning algorithms select and return the motifs that most resemble the training data. This process is validated by running it on actual music scores and testing how closely the

discovered motifs match the expected motifs. We examine the information content of the discovered motifs by comparing the entropy of the discovered motifs, candidate motifs, and training data. We measure innovation by comparing the probability of the training data and the probability of the discovered motifs given the model.

François Pachet and Pierre Roy

Non-Conformant Harmonization: The Real Book in the Style of Take 6

We address the problem of automatically harmonizing a leadsheet in the style of any arranger. We model the arranging style as a Markov model estimated from a corpus of non-annotated MIDI files. We consider a vertical approach to harmonization, in which chords are all taken from the arranger corpus. We show that standard Markov models, using various vertical viewpoints are not adapted for such a task, because the problem is basically over constrained. We propose the concept of fioriture to better capture the subtleties of an arranging style. Fioritures are ornaments of the given melody during which the arranging style can be expressed more freely than for melody notes. Fioritures are defined as random walks with unary constraints and can be implemented with the technique of Markov constraints. We claim that fioritures lead to musically more interesting harmonizations than previous approaches and discuss why. We focus on the style of Take 6, arguably the most sophisticated arranging style in the jazz genre, and we demonstrate the validity of our approach by harmonizing a large corpus of standard leadsheets.

Anna Jordanous, Daniel Allington and Byron Dueck

Using online networks to analyse the value of electronic music

If evaluating how creative a program or an artefact is, a key factor to consider is the value inherent in that program or artefact. Our research investigates the process by which cultural products may be accorded a form of specifically cultural value independent of market value, focusing in particular on how that process has been transformed through mediation by online networks. To do this, we are studying a specific artform, i.e. music, and evidence from a specific website, i.e. SoundCloud, making a case study of a specific genre with a special association with that website: electronic music. Quantitative analysis ranges across all genres of music represented on the website, with social network graphs being constructed from relational data and corpus analysis being carried out on textual data. Interviews and observational research are being carried out with electronic music performers in order both to explore what interaction on the site means to them on a qualitative level and to study how the production and circulation of value on the site relates to the production and circulation of value in offline environments. This project will make available a methodology and supporting software for measuring creative value through relevant network analysis.

Maria Navarro, Juan Manuel Corchado and Yves Demazeau

A Musical Composition Application Based on a Multiagent System to Assist Novice Composers

This paper presents a solution to make harmonies in order to help novice composers. A multiagent approach based on virtual organizations has been used to construct this application. This model is built by using a multiagent system. This study presents a Multi-Agent System (MAS) built with PANGEA, a platform to develop different multiagent systems, capable of composing music following the HS algorithm. The results show the success of this application in composing a classical harmony correctly.

EVALUATION**Session chair: TBC****Oliver Bown**

Empirically Grounding the Evaluation of Creative Systems: An Interaction Design Approach

In this paper I argue that the evaluation of artificial creative systems in the direct form currently practiced is not in itself empirically well-grounded, hindering the potential for incremental development in the field. I propose an approach to evaluation that is grounded in thinking about interaction design, and inspired by an anthropological understanding of human creative behaviour. This requires looking at interactions between systems and humans using a richer cultural model of creativity, and the application of empirically better-grounded methodological tools that view artificial creative systems as situated in cultural contexts. The applicability of the concepts 'usability' and 'user experience' are considered for creative systems evaluation, and existing evaluation frameworks including Colton's creativity tripod and Ritchie's 18 criteria are reviewed from this perspective.

Kazjon Grace and Mary Lou Maher

What to expect when you're expecting: The role of unexpectedness in computationally evaluating creativity

Novelty, surprise and transformation of the domain have each been raised – alone or in combination – as accompaniments to value in the determination of creativity. Spirited debate has surrounded the role of each factor and their relationships to each other. This paper suggests a way by which these three notions can be compared and contrasted within a single conceptual framework, by describing each as a kind of unexpectedness. Using this framing we argue that current computational models of novelty, concerned primarily with the originality of an artefact, are insufficiently broad to capture creativity, and that other kinds of expectation – whatever the terminology used to refer to them – should also be considered. We develop a typology of expectations relevant to computational creativity evaluation and, through it describe a series of situations where expectations would be essential to the characterisation of creativity.

Anna Jordanous

Stepping Back to Progress Forwards: Setting Standards for Meta-Evaluation of Computational Creativity

There has been increasing attention paid to the question of how to evaluate the creativity of computational creativity systems. A number of different evaluation methods, strategies and approaches have been proposed recently, causing a shift in focus: which methodology should be used to evaluate creative systems? What are the pros and cons of using each method? In short: how can we evaluate the different creativity evaluation methodologies? To answer this question, five meta-evaluation criteria have been devised from cross-disciplinary research into good evaluative practice. These five criteria are: correctness; usefulness; faithfulness as a model of creativity; usability of the methodology; generality. In this paper, the criteria are used to compare and contrast the performance of five various evaluation methods. Together, these meta-evaluation criteria help us explore the advantages and disadvantages of each creativity evaluation methodology, helping us develop the tools we have available to us as computational creativity researchers.

Simon Colton, Alison Pease, Joe Corneli and Michael Cook

Assessing Progress in Building Autonomously Creative Systems

Determining conclusively whether a new version of software creatively exceeds a previous version or a third party system is difficult, yet very important for scientific approaches in Computational Creativity research. We argue that software product and process need to be assessed simultaneously in assessing progress, and we introduce a diagrammatic formalism which exposes various timelines of creative acts in the construction and execution of successive versions of artefact-generating software. The formalism enables estimations of progress or regress from system to system by comparing their diagrams and assessing changes in quality, quantity and variety of creative acts undertaken; audience perception of behaviours; and the quality of artefacts produced. We present a case study in the building of evolutionary art systems, and we use the formalism to highlight various issues in measuring progress in the building of creative systems.

EVALUATION/DATA**Session chair: Nada Lavrač****Diarmuid O'Donoghue**

Can a Computationally Creative System Create Itself? Creative Artefacts and Creative Processes

This paper begins by briefly looking at two of the dominant perspectives on computational creativity; focusing on the creative artefacts and the creative processes respectively. We briefly describe two projects; one focused on (artistic) creative artefacts the other on a (scientific) creative process, to highlight some similarities and differences in approach. We then look at a 2-dimensional model of Learning Objectives that uses independent axes of knowledge and (cognitive) processes. This educational framework is then used to cast artefact and process perspectives into a common framework, opening up new possibilities for discussing and comparing creativity between them. Finally, arising from our model of creative processes, we propose a new and broad 4-level hierarchy of computational creativity, which asserts that the highest level of computational creativity involves processes whose creativity is comparable to that of the originating process itself.

Horacio Saggion and Francesco Barbieri

Automatic Detection of Irony and Humour in Twitter

Irony and humour are just two of many forms of figurative language. Approaches to identify in vast volumes of data such as the internet humorous or ironic statements is important not only from a theoretical viewpoint but also for their potential applicability in social networks or human-computer interactive systems. In this study we investigate the automatic detection of irony and humour in social networks such as Twitter casting it as a classification problem. We propose a rich set of features for text interpretation and representation to train classification procedures. In cross-domain classification experiments our model achieves and improves state-of-the-art performance.

Babak Saleh, Kanako Abe and Ahmed Elgammal

Knowledge Discovery of Artistic Influences: A Metric Learning Approach

We approach the challenging problem of discovering influences between painters based on their fine-art paintings. In this work, we focus on comparing paintings of two painters in terms of visual

similarity. This comparison is fully automatic and based on computer vision approaches and machine learning. We investigated different visual features and similarity measurements based on two different metric learning algorithms to find the most appropriate ones that follow artistic motifs. We evaluated our approach by comparing its result with ground truth annotation for a large collection of fine-art paintings.

LANGUAGE/NARRATIVE #1

Session chair: Tony Veale

Michael Smith, Ryan Hintze and Dan Ventura

Nehovah: A Neologism Creator Nomen Ipsum

In this paper, we describe a system called Nehovah that generates neologisms from a set of base words provided by a user. Nehovah focuses on creating "good" neologisms by evaluating various attributes of a neologism such as how well it communicates the source concepts and how "catchy" it is. Because Nehovah depends on the user to weight the importance of various attributes of the neologism and to choose the source concepts, it is at this point most appropriately considered a collaborative system rather than an autonomous one. To demonstrate the utility of the system, we show several examples of system output and discuss the creativity of Nehovah with respect to several characteristics critical for any computational creative system: appreciation, imagination, skill and accountability.

Pablo Gervás and Carlos León

Reading and Writing as a Creative Cycle: The Need for a Computational Model

The field of computational narratology has produced many efforts aimed at generating narrative by computational means. In recent times, a number of such efforts have considered the task of modelling how a reader might consume the story. Whereas all these approaches are clearly different aspects of the task of generating narrative, so far the efforts to model them have occurred as separate and disjoint initiatives. There is an enormous potential for improvement if a way was found to combine results from these initiatives with one another. The present position paper provides a breakdown of the activity of creating stories into five stages that are conceptually different from a computational point of view and represent important aspects of the overall process as observed either in humans or in existing systems. These stages include a feedback loop that builds interpretations of an ongoing composition and provides feedback based on these to inform the composition process. This model provides a theoretical framework that can be employed first to understand how the various aspects of the task of generating narrative relate to one another, second to identify which of these aspects are being addressed by the different existing research efforts, and finally to point the way towards possible integrations of these aspects within progressively more complex systems.

Iván Guerrero Román and Rafael Pérez y Pérez

Social Mexica: A computer model for social norms in narratives

Several models for automatic storytelling represent social norms by embedding into their structures social knowledge. In contrast, this model explicitly describes computational structures to represent knowledge related to social norms, mechanisms to identify when a social norm is broken within a narrative and a set of constraints and filters to employ such social knowledge during the narrative generation process. An implementation of the model employing MEXICA, an automatic storyteller based on the Engagement- Reflection creativity model, as source of story

plots is presented. Lastly, the results of a survey are presented as a preliminary evaluation of the model.

Carlos León and Pablo Gervás

Creativity in Story Generation From the Ground Up: Non-deterministic Simulation driven by Narrative

Creativity in narrative requires careful management of knowledge but story generation systems focusing on creativity have typically circumvented this level of detail by using high level descriptions of events and relations. While this has proven effective for plot generation, narrative generation can be drastically enriched with a grounded representation of actions based on low level simulation. This level of detail and robust knowledge representation can form the basis for a conceptual space exploration driven by narrative knowledge, namely by guiding non-deterministic generation of successive simulation states composing a story. This paper presents an updated version of the story generation system STella that implements this hybrid model, along with results and discussion on the relative benefits of the described approach.

LANGUAGE/NARRATIVE #2

Session chair: Pablo Gervás

Maria Teresa Llano, Rose Hepworth, Simon Colton, Jeremy Gow, John Charnley, Nada Lavrač, Martin Žnidaršič, Matic Perovšek, Mark Granroth-Wilding and Stephen Clark

Baseline Methods for Automated Fictional Ideation

The invention of fictional ideas (ideation) is often a central process in the creative production of artefacts such as poems, music and paintings, but has barely been studied in the Computational Creativity community. We present here three baseline approaches for automated fictional ideation, using methods which invert and alter facts from the ConceptNet and ReVerb databases, and perform bisociative discovery. For each method, we present a curation analysis, by calculating the proportion of ideas which pass a typicality evaluation. We further evaluate one ideation approach through a crowd-sourcing experiment in which participants were asked to rank ideas. The results from this study, and the baseline methods and methodologies presented here, constitute a firm basis on which to build more sophisticated models for automated ideation with evaluative capacity.

Rafael Pérez y Pérez

The Three Layers Evaluation Model for Computer-Generated Plots

This paper describes a model for evaluating a computer-generated plot. The main motivation of this project is to provide MEXICA, our plot generator, with the capacity of evaluating its own outputs as well as assessing narratives generated by other agents that can be employed to enrich its knowledge base. We present a description of our computer model as well as an explanation of our first prototype. Then, we show the results of assessing three computer-generated narratives. The outcome suggests that we are in the right direction, although much more work is required.

Amitava Das and Björn Gambäck

Poetic Machine: Computational Creativity for Automatic Poetry Generation in Bengali

The paper reports an initial study on computational poetry generation for Bengali. Bengali is a morpho-syntactically rich language and partially phonemic. The poetry generation task has been defined as a follow-up rhythmic sequence generation based on user input. The design process

ABSTRACTS

involves rhythm understanding from the given input and follow-up rhyme generation by leveraging syllable/phonetic mapping and natural language generation techniques. A syllabification engine based on grapheme-to-phoneme mapping has been developed in order to understand the given input rhyme. A Support Vector Machine-based classifier then predicts the follow-up syllable/phonetic pattern for the generation and candidate words are chosen automatically, based on the syllable pattern. The final rhythmic poetical follow-up sentence is generated through n-gram matching with weight-based aggregation. The quality of the automatically generated rhymes has been evaluated according to three criteria: poeticness, grammaticality, and meaningfulness.

Tony Veale

Coming Good and Breaking Bad: Generating Transformative Character Arcs For Use in Compelling Stories

Stories move us emotionally by physically moving their protagonists, from place to place or from state to state. The most psychologically compelling stories are stories of change, in which characters learn and evolve as they fulfil their dreams or become what they most despise. Character-driven stories must do more than manoeuvre their protagonists as game pieces on a board, but move them along arcs that transform their inner qualities. This paper presents the Flux Capacitor, a generator of transformative character arcs that are both intuitive and dramatically interesting. These arcs – which define a conceptual start-point and end-point for a character in a narrative – may be translated into short story pitches or used as inputs to an existing story-generator. A corpus-based means of constructing novel arcs is presented, as are criteria for selecting and filtering arcs for well-formedness, plausibility and interestingness. Characters can thus, in this way, be computationally modeled as dynamic blends that unfold along a narrative trajectory.

HIGH LEVEL ISSUES

Session chair: Alison Pease

Oliver Bown

A Model of Runaway Evolution of Creative Domains

Creative domains such as art and music have distinct properties, not only in terms of the structure of the artefacts produced, but in terms of their cultural dynamics and relation to adaptive functions. A number of theories have examined the possibility of functionless cultural domains emerging through a runaway evolutionary process. This includes models in which engaging in creative domains is actually counterproductive at the individual level, but is sustained as a behaviour through an evolutionary mechanism. I present a multi-agent model that examines such an evolutionary mechanism, derived from these theories.

Stephen McGregor, Geraint Wiggins and Matthew Purver

Computational Creativity: A Philosophical Approach, and an Approach to Philosophy

This paper seeks to situate computational creativity in relation to philosophy and in particular philosophy of mind. The goal is to investigate issues relevant to both how computational creativity can be used to explore philosophical questions and how philosophical positions, whether they are accepted as accurate or not, can be used as a tool for evaluating computational creativity. First, the possibility of symbol manipulating machines acting as creative agents will be examined in terms of its ramifications for historic and contemporary theories of mind. Next a philosophically motivated mechanism for evaluating creative systems will be proposed, based on the idea that an

intimation of dualism, with its inherent mental representations, is a thing that typical observers seek when evaluating creativity. Two computational frameworks that might adequately satisfy this evaluative mechanism will then be described, though the implementation of such systems in a creative context is left for future work. Finally, the kind of audience required for the type of evaluation proposed will be briefly discussed.

Colin Johnson

Is it Time for Computational Creativity to Grow Up and start being Irresponsible?

A recent definition of computational creativity has emphasised that computational creativity systems should "take on certain responsibilities" for generating creative behaviour. This paper examines the notion of responsibilities in that definition, and looks at a number of aspects of the creative act and its context that might play a role in that responsibility, with an emphasis on artistic and musical creativity. This problematises the seemingly simple distinction between systems that have responsibilities for creative activity and those which support or provide tools for creativity. The paper concludes with a discussion of an alternative approach to the subject, which argues that the responsibility for creative action is typically diffused through a complex human/computer system, and that a "systems thinking" approach to locating computational creativity might ask better questions than one that tries to pin creative responsibility to a particular agent.

LATE BREAKING PAPERS #1

Session chair: Ruli Manurung

D.P. O'Donoghue, H Saggion, D. Hurley, Y. Abgaz, F. Dong, X. Zheng, O. Corcho, J.J. Zhang, J-M Careil, B. Mahdian, X. Zhao

Promoting Scientific Creativity with *Dr. Inventor*

We present an analogy-based model to promoting creative scientific reasoning among its users. Dr. Inventor will find (novel and potentially useful) creative analogies between academic documents, presenting them to users as potential research questions to be investigated and explored. These novel comparisons will thereby drive its users' creative reasoning. Dr. Inventor is aimed at promoting Big-C Creativity and the H-creativity associated with true scientific creativity.

Agnese Augello, Ignazio Infantino, Giovanni Pilato, Riccardo Rizzo and Filippo Vella

Combining Representational Domains for Computational Creativity

The paper describes a combinatorial creativity module embedded in a cognitive architecture. The proposed module is based on the focus of attention model proposed by (Gabora 2002) and is implemented using Self Organising Map (SOM) neural networks.

Anhong Zhang and Rob Saunders

Exploring Conceptual Space in Language Games Using Hedonic Function

The ambiguity of natural language can be an important source of creative concepts. In compositional languages, a many-to-many network of associations exists linking concepts by the polysemy and synonymy of utterances. This network allows utterances to represent the combination of concepts, forming new and potentially interesting compound meanings. At the same time, new experiences of external and internal contexts provide abundant materials for the evolution of language. This paper focuses on exploring the role of compositional language for social creativity through the simulation of language games running on multi-agent systems using

an hedonic function to evaluate the interest of utterances as design requirements and the resulting design works.

Santiago Negrete-Yankelevich and Nora Morales

The apprentice framework: planning and assessing creativity

In this paper we introduce and discuss the apprentice framework, which we speculate can be used to plan and evaluate computational creativity projects. The framework defines a sequence of phases a system must follow in order to reach a level of creativity acceptable to a set of human judges. It also establishes four aspects of a creative piece susceptible of creative work. We mention some examples from different artistic disciplines. Our work focuses on establishing an environment as well as a team of people and machines to foster, study and monitor the emergence of creativity.

Wendy Aguilar and Rafael Pérez y Pérez

Criteria for Evaluating Early Creative Behavior in Computational Agents

Our research is focused on the study of the genesis of the creative process. With this purpose we have created a developmental computational agent, which allows us to watch the generation of the first behaviors we could consider as creative. It is very important to develop methodologies to evaluate the behaviors generated by this kind of agent. This paper represents our first effort towards that end. Here we propose five criteria for its evaluation, and we use them to test the behaviors created by our developmental agent.

PLATFORMS/Frameworks

Session chair: Rafael Pérez y Pérez

Marco Schorlemmer, Alan Smaill, Kai-Uwe Kühnberger, Oliver Kutz, Simon Colton, Emiliós Cambouropoulos and Alison Pease

COINVENT: Towards a Computational Concept Invention Theory

We aim to develop a computationally feasible, cognitively-inspired, formal model of concept invention, drawing on Fauconnier and Turner's theory of conceptual blending, and grounding it on a sound mathematical theory of concepts. Conceptual blending, although successfully applied to describing combinational creativity in a varied number of fields, has barely been used at all for implementing creative computational systems, mainly due to the lack of sufficiently precise mathematical characterisations thereof. The model we will define will be based on Goguen's proposal of a Unified Concept Theory, and will draw from interdisciplinary research results from cognitive science, artificial intelligence, formal methods and computational creativity. To validate our model, we will implement a proof of concept of an autonomous computational creative system that will be evaluated in two testbed scenarios: mathematical reasoning and melodic harmonisation. We envisage that the results of this project will be significant for gaining a deeper scientific understanding of creativity, for fostering the synergy between understanding and enhancing human creativity, and for developing new technologies for autonomous creative systems.

Oliver Kutz, Till Mossakowski, Fabian Neuhaus and Mihai Codrescu

Blending in the Hub: Towards a collaborative concept invention platform

Conceptual blending has been employed very successfully to understand the process of concept invention, studied particularly within cognitive psychology and linguistics. However, despite this

influential research, within computational creativity little effort has been devoted to fully formalise these ideas and to make them amenable to computational techniques. We here present the basic formalisation of conceptual blending, as sketched by the late Joseph Goguen, and show how the Distributed Ontology Language DOL can be used to declaratively specify blending diagrams. Moreover, we discuss in detail how the workflow and creative act of generating and evaluating a new, blended concept can be managed and computationally supported within Ontohub, a DOL-enabled theory repository with support for a large number of logical languages and formal linking constructs.

Antonio Chella, Salvatore Gaglio, Gianluigi Oliveri, Agnese Augello and Giovanni Pilato
Creativity in Conceptual Space

The main aim of this paper is contributing to what in the last few years has been known as computational creativity. This will be done by showing the relevance of a particular mathematical representation of Gärdenfors's conceptual spaces to the problem of modelling a phenomenon which plays a central role in producing novel and fruitful representations of perceptual patterns: analogy.

John Charnley, Simon Colton and Maria Teresa Llano

The FloWr Framework: Automated Flowchart Construction, Optimisation and Alteration for Creative Systems

We describe the FloWr framework for implementing creative systems as scripts over processes and manipulated visually as flowcharts. FloWr has been specifically developed to be able to automatically optimise, alter and ultimately generate novel flowcharts, thus innovating at process level. We describe the fundamental architecture of the framework and provide examples of creative systems which have been implemented in FloWr. Via some preliminary experimentation, we demonstrate how FloWr can optimise a given system for efficiency and yield, alter input parameters to increase unexpectedness, and build novel generative systems automatically.

LATE BREAKING PAPERS #2

Session chair: Oliver Bown

Nan Shao, Pavankumar Murali and Anshul Sheopuri

New Developments in Culinary Computational Creativity

In this paper, we report developments in the evaluation and generation processes in culinary computational creativity. In particular, we explore the personalization aspect of the quality and novelty assessment of newly created recipes. In addition, we argue that evaluation should be a part of the generation process and propose an optimization-based approach for the recipe creation problem. The experimental results show a more than 41% lift in the objective evaluation metrics when compared to a sampling approach to recipe creation.

Ashish Jagmohan, Ying Li, Nan Shao, Anshul Sheopuri, Dashun Wang, Lav Varshney and Pu Huang

Exploring Application Domains for Computational Creativity

We are motivated by the recent application of computational creativity in the culinary domain. Given the increasing commercial importance of data-driven computation, we explore and provide a unified framework in three new domains to which computational creativity can be applied and yield business value. The three domains are travel, fashion, and science. Reflecting on the

framework characterization, we identified two properties common across these domains, related to the creative space and codified domain knowledge. We believe that these properties may have value as sufficient, but not necessary, conditions to identify domains suitable for industrializing computational creativity. We are working towards finding tight properties common across different domains as well as ones that exclude domains.

Andrés Gómez de Silva Garza and Rafael Pérez y Pérez

Towards Evolutionary Story Generation

In this paper we describe on-going work on combining two existing models of computational creativity. The GENCAD model proposes the use of an evolutionary algorithm (EA) that uses a population of exemplars as a starting point for its search, unlike traditional EA's, which use a randomly-generated initial population. The EA, operating on this population, is then used to generate new potentially creative solutions. GENCAD has been instantiated in the domains of structural design of tall buildings and feng shui-compliant residential floor-plan design. The MEXICA model also begins with a set of exemplars as a starting point, but it analyzes these exemplars based on a domain theory. The general theory that is obtained from analyzing the set of exemplars is then used to guide the generation of new solutions. MEXICA has been instantiated in the domain of plot generation for stories involving themes, characters and locations from the Mexica culture of ancient Mexico. In the hybrid model we propose in this paper, we combine the two models to generate plots for stories of the same sort that MEXICA generates, but using GENCAD's process model to do so.

Oskar Gross, Jukka Toivanen, Sandra Lääne and Hannu Toivonen

Arts, News, and Poetry - The Art of Framing

This paper presents an art project which combines computational and human creativity. The paintings created during the project visualize a process of generating computational poetry from daily news stories. We describe how the computational processes of generating poetry were visualized and then turned into paintings by an artist. The project has been exhibited in Finland and Estonia. The feedback collected during the exhibition in Finland is also included in the paper.

Polona Tomašič, Martin Žnidaršič and Gregor Papa

Implementation of a Slogan Generator

Generation of slogans for companies, products or similar entities is a creative task that is difficult to automate. In this paper we describe our attempt of tackling this problem by combining computational linguistics, semantic resources and genetic algorithms.

Tom De Smedt, Lucas Nijs and Walter Daelemans

Creative Web Services with Pattern

Pattern is a Python toolkit for web mining, natural language processing, machine learning, network analysis and data visualisation. In this paper, we discuss how it can be useful as a computational creativity tool, in particular how its new pattern.server module can be used to set up creative web services.

Ivan Manuel Laclaustra, José Luis Ledesma, Gonzalo Mendez and Pablo Gervás

Kill the Dragon and Rescue the Princess: Designing a Plan-Based Multi-agent Story Generator

We describe a prototype of a story generator that uses a multi-agent system and a planner to simulate the stories it generates. The objective is to develop a system that is able to produce a

wide range of stories by changing its configuration options and the domain knowledge. The resulting prototype is a proof of concept that integrates the simplest pieces that are necessary to generate the stories.

Simon Colton and Dan Ventura

You Can't Know my Mind: A Festival of Computational Creativity

We report on a week-long celebration of Computational Creativity research and practice in a gallery in Paris, France. The festival was called You Can't Know my Mind, and was intended to introduce to the public the idea that researchers such as ourselves are writing software to be surprisingly unpredictable and creative in nature. The festival included a traditional art exhibition with a vernissage, a live music evening, a poetry night coupled with a food tasting, and a week-long demonstration of mood-driven portraiture from The Painting Fool software. Each of the events – which are described here for the first time – involved an element of creative responsibility taken on by various software systems. The success of the festival was demonstrated in terms of attendance and feedback, pieces written by journalists, and follow up events which have taken place in 2013 and 2014.

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USEFUL PHRASES IN SLOVENE

Yes - Da

No - Ne

Hello - Zdravo/Živijo

Good morning - Dobro jutro

Good day - Dober dan (do-brdan)

Goodbye - Nasvidenje (nas-vee-danye)

Please - Prosim (pro-seem)

Thank you - Hvala lepa

You're welcome - Ni zakaj (nee za-kaj)

Excuse me - Dovolite mi, prosim (dovo-lee-temee, pro-seem)

Sorry - Oprostite (o-pro-stee-te)

Can you help me? - Mi lahko pomagate?

I don't understand - Ne razumem

Could you repeat that, please? - Lahko ponovite?

Where are you from? - Od kod ste?

I'm from... - Sem iz.... (sameez)

What's your name? - Kako vam je ime? (formal) Or Kako ti je ime? (informal)

My name's... - Jaz sem (yassam)

I'd like.... - Rad/Rada bi...

How much is it? - Koliko stane?

Open - Odprto

Closed - Zaprto

Toilet - Stranišče (strah-neesh-cheh)

Day - Dan

Today - Danes

Tomorrow - Jutri

Yesterday - Včeraj

Week - Teden

Month - Mesec

Year - Leto

Coffee - Kava

Beer - Pivo

Wine - Vino

AUTHOR INDEX

- Agnese Augello, 27, 29
 Ahmed Elgammal, 23
 Alan Smaill, 28
 Alberto Díaz, 19
 Alison Pease, 23, 28
 Amitava Das, 25
 Andrés Gómez de Silva Garza, 30
 Anhong Zhang, 27
 Anna Jordanous, 21, 22
 Anna Kantosalu, 17
 Anshul Sheopuri, 29
 Antonio Chella, 29
 Antonios Liapis, 19
 Ashish Jagmohan, 29
 B. Mahdian, 27
 Babak Saleh, 23
 Bipin Indurkha, 20
 Björn Gambäck, 25
 Brian Magerko, 18
 Byron Dueck, 21
 Carlos León, 24, 25
 Chih-Pin Hsiao, 18
 Colin Johnson, 27
 D. Hurley, 27
 Dan Ventura, 18, 20, 24, 31
 Daniel Allington, 21
 Daniel Johnson, 20
 Dashun Wang, 29
 David Norton, 18
 Derrall Heath, 18
 Diarmuid O'Donoghue, 23, 27
 Dingtian Zhang, 18
 Emilios Cambouropoulos, 28
 F. Dong, 27
 Fabian Neuhaus, 28
 Fam Rashel, 20
 Filippo Vella, 27
 Francesco Barbieri, 23
 François Pachet, 21
 Georgios Yannakakis, 19
 Geraint Wiggins, 26
 Gianluigi Oliveri, 29
 Giovanni Pilato, 27, 29
 Gonzalo Mendez, 30
 Gregor Papa, 30
 H Saggion, 27
 Hannu Toivonen, 17, 19, 30
 Horacio Saggion, 23
 Hugo Gonçalo Oliveira, 19
 Ignazio Infantino, 27
 Iván Guerrero Román, 24
 Ivan Manuel Laclaustra, 30
 Ivan Sysoev, 18
 J.J. Zhang, 27
 Jeremy Gow, 25
 J-M Careil, 27
 Joanna Misztal, 20
 Joe Corneli, 23
 John Charnley, 25, 29
 José Luis Ledesma, 30
 Juan Manuel Corchado, 21
 Jukka Toivanen, 17, 19, 30
 Julian Togelius, 19
 Kai-Uwe Kühnberger, 28
 Kanako Abe, 23
 Kazjon Grace, 22
 Lav Varshney, 29
 Liane Gabora, 17
 Lucas Nijs, 30
 Marco Schorlemmer, 28
 Maria Navarro, 21
 Maria Teresa Llano, 25, 29
 Mark Granroth-Wilding, 25
 Martin Žnidaršič, 25, 30
 Mary Lou Maher, 22
 Matic Perovšek, 25
 Matthew Purver, 26
 Michael Cook, 19, 23
 Michael Smith, 24
 Mihai Codescu, 28
 Nada Lavrač, 25
 Nan Shao, 29
 Nicholas Davis, 18
 Nora Morales, 28
 O. Corcho, 27
 Oliver Bown, 22, 26
 Oliver Kutz, 28
 Oskar Gross, 19, 30
 Pablo Gervás, 19, 24, 25, 30
 Pavankumar Murali, 29
 Pierre Roy, 21
 Ping Xiao, 17
 Polona Tomašič, 30
 Pu Huang, 29
 Rafael Pérez y Pérez, 24, 25, 28, 30
 Raquel Hervás, 19

AUTHOR INDEX

Riccardo Rizzo, 27
Rob Saunders, 27
Robert Tubb, 17
Rose Hepworth, 25
Ruli Manurung, 20
Ryan Hintze, 24
Salvatore Gaglio, 29
Sandra Lääne, 30
Santiago Negrete-Yankelevich, 28
Simon Colton, 19, 23, 25, 28, 29, 31
Simon Dixon, 17
Simon Tseng, 17
Stephen Clark, 25
Stephen McGregor, 26
Tatsuo Unemi, 18
Till Mossakowski, 28
Tom De Smedt, 30
Tony Veale, 26
Walter Daelemans, 30
Wendy Aguilar, 28
X. Zhao, 27
X. Zheng, 27
Y. Abgaz, 27
Yanna Popova, 18
Ying Li, 29
Yves Demazeau, 21

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