

# Stuart James

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**BIO** Stuart is currently a Research Fellow at the University of Surrey exploring visual big data problems. His current EPSRC project looks at social media implications across different lifespan transitions; utilising multi-label classification and clustering through Deep Learning methods. His PhD explored how sketched storyboards can be used for retrieval. Developing novel algorithms for computer vision, machine learning and computer graphics applications (See page 4). He has maintained a strong software engineering ethic and demonstrated through prototype research systems.

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**SKILLS & ABILITIES** **Research Areas:** Information Retrieval, Computer Vision, Computer Graphics, Machine Learning, Transfer Learning, AI  
**Languages:** C++, C, Python, Matlab, PHP, C#, Java Script, HTML, Visual Basic, Prolog, Assembly, GLSL, HLSL, CG, Assembly  
**Frameworks / Standards:** Scikit Boost, Poco, HTML5, .NET, WPF, XAML, OpenGL, DirectX,

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**EDUCATION** **PHD INFORMATION RETRIEVAL - CVSSP, UNIVERSITY OF SURREY [2010 - 2015]**  
**Thesis Title:** Visual Narratives: Free-hand Sketch for Visual Search and Navigation of Video  
**Supervisors:** Dr John Collomosse and Dr Krystian Mikolajczyk  
Media retrieval has been dominated by text based queries (meta-data), but such queries are cumbersome to describe appearance and temporal information. This work explores the use of sketch as an intuitive way to query media content.  
Sketch based Video retrieval has traditionally applied complex model fitting we explore a representation suitable to index structure for sublinear query time. Additionally supporting getting the 'user in the loop' through relevance feedback.  
Secondly we propose Sketch based Human Pose Retrieval (SBHPR), a method of finding humans postures within videos using stick man depiction. Developing a manifold based retrieval method and learning a domain adaptation to improve precision on new videos.  
Finally we extended the SBHPR method to a storyboard allowing a sequence of pose and action labels (run, jump) to be intertwined. This is demonstrated for video segment retrieval and synthesis of a new video, by extending the motion graph technique.  
**BSC COMPUTER SCIENCE WITH GAMES DEVELOPMENT – UNIVERSITY OF HULL [2005-2009]**  
**Grade:** Upper Second (2,1)  
**Dissertation:** Fluid dynamics Simulation interacting with rigid body objects using Smoothed Particle Hydrodynamics based on Muller's algorithm.  
**Projects:** PSP Development Kit, allowing easy accessibility to the PSP platform to students. More available on website.

## WORK EXPERIENCE

**RESEARCH FELLOW, UNIVERSITY OF SURREY [FULL TIME]**

August 2013 – September 2015

An EPSRC funded project exploring the digital effect on key life transition points, through Social Media. The project required the development of algorithms for classification and clustering utilising both Image and Text. Additionally explored data purification of large noisy social media datasets using Genetic Algorithms. As well as a structured manifold mapping techniques for presentation of user data through a 2D game interface.

**IT MANAGER, JCS TECHNOLOGY [PART TIME]**

December 2003 - Present

Providing Computer Support for a Small Business. Demonstrated through Developing reliable systems with strong backup and recovery policies. Work at JCS Technology involved setting up server and network infrastructure and support for a variety of platforms Window, Linux and bespoke platforms. The role provided the opportunity to work within a budget and make key decisions on the day to day operating of the business.

**TEACHING ASSISTANT, UNIVERSITY OF SURREY [PART TIME]**

October 2010 – May 2013

Providing Teaching Lab assistance for the following modules:

- C++ Programming, 3rd Year / Masters EE Students  
*Taught by Prof Richard Bowden (3 Years)*
- Computer Vision and Pattern Recognition 3rd Year EE Students  
*Taught by Dr John Collomosse. (2 Years)*
- C Programming 1st Year EE Students,  
*Taught by Prof Richard Bowden (1 Year)*

## AWARDS

BMVA Summer School Poster Competition Runner Up  
Imagine Cup 2006 Software Design Challenge Top 10  
Worle School Prefect  
Worle School Work Experience Award

## INTERNSHIPS

INESC-ID, IST, Lisbon, Portugal PhD Research Lab Visit:  
- 2 Months 2012  
- 4 Months 2013

HOBBIES &  
INTERESTS

Programming, Running – Current achievements 10k and Half Marathon, working towards a Marathon, Climbing, Music - Including playing Drums, Board Games

OTHER  
QUALIFICATIONS

**A-Levels:** Computing(C), Mathematics(C), Chemistry (D) **AS-Levels:** Physics (E)  
**GCSEs:** Double Science (B), Mathematics (B), Business Studies (B), ICT (B), English(C), History(C), Religious Studies(C), Design and Technology(C)

## REFERENCES

**Work / PhD Supervisor:** Dr John Collomosse, CVSSP, University of Surrey,  
[J.Collomosse@Surrey.ac.uk](mailto:J.Collomosse@Surrey.ac.uk), +44 (0) 1483 686035  
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## Publications

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- **S James** M Fonseca and J Collomosse. "Visual Narratives: Free-hand Sketch for Visual Search and Navigation of Video". [Under review] Submitted at IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI). IEEE. 2015.
- J Collomosse **S James** A Durrant D Trujillo-Pisanty W Moncur K Orzech S Martindale M Chantler. "Enhanced Digital Literacy by Multi-modal Data Mining of the Digital Lifespan". Proceedings of Digital Economy (DE2014). 2014
- **S James** and J Collomosse. "Interactive Video Asset Retrieval using Sketched Queries". Proceedings of Conference on Visual Media Production (CVMP). ACM. 2014.
- C Gray **S James** J Collomosse and P Asente. "A Particle Filtering approach to salient video object localization". Proceedings of International Conference on Image Processing (ICIP). IEEE. 2014.
- **S James** M Fonseca and J Collomosse. "ReEnact: Sketch based Choreographic Design from Archival Dance Footage". Proceedings of ACM International Conference on Multimedia Retrieval (ICMR). ACM. 2014.
- D Trujillo-Pisanty A Durrant S Martindale **S James** J Collomosse. "Admixed Portrait: Design Intervention to Prompt Reflection on Being Online as a New Parent". Proceedings of DIS'14. ACM. 2014.
- R Hu and **S James** T Wang and J Collomosse. "Markov Random Fields for Sketch based Video Retrieval". Proceedings ACM International Conference on Multimedia Retrieval (ICMR). ACM. 2013.
- M Fonseca and **S James** and J Collomosse. "Skeletons from Sketches of Dancing Poses". Proceedings VL/HCC 2012. IEEE. 2012
- R Hu and **S James** and J Collomosse. "Annotated Free-hand Sketches for Video Retrieval using Object Semantics and Motion". Proceedings of ACM MultiMedia Modelling (MMM). Springer LNCS. 2012.
- **S James** and J Collomosse. "Annotated Sketches for Intuitive Video Retrieval". BMVA / AVA Workshop on Biological and Machine Vision. Perception Journal. May 2011.

# Phd Thesis Summary

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Humans have an innate ability to communicate visually; the earliest forms of communication were cave drawings, and children can communicate visual descriptions of scenes through drawings well before they can write. Drawings and sketches offer an intuitive and efficient means for communicating visual concepts.

Today, society faces a deluge of digital visual content driven by a surge in the generation of video on social media and the online availability of video archives. Mobile devices are emerging as the dominant platform for consuming this content, with Cisco predicting that by 2018 over 80% of mobile traffic will be video. Sketch offers a familiar and expressive modality for interacting with video on the touch-screens commonly present on such devices.

The thesis contributes several new algorithms for searching and manipulating video using free-hand sketches. We propose the Visual Narrative (VN); a storyboarded sequence of one or more actions in the form of sketch that collectively describe an event. We show that VNs can be used to both efficiently search video repositories, and to synthesise video clips.

First, we describe a sketch based video retrieval (SBVR) system that fuses multiple modalities (shape, colour, semantics, and motion) in order to find relevant video clips. An efficient multimodal video descriptor is proposed enabling the search of hundreds of videos in milliseconds. This contrasts with prior SBVR that lacks an efficient index representation, and take minutes or hours to search similar datasets. This contribution not only makes SBVR practical at interactive speeds, but also enables user-refinement of results through relevance feedback to resolve sketch ambiguity, including the relative priority of the different VN modalities. Second, we present the first algorithm for sketch based pose retrieval. A pictographic representation (stick-men) is used to specify a desired human pose within the VN, and similar poses found within a video dataset. We use archival dance performance footage from the UK National Resource Centre for Dance (UK-NRCD), containing diverse examples of human pose. We investigate appropriate descriptors for sketch and video, and propose a novel manifold learning technique for mapping between the two descriptor spaces and so performing sketched pose retrieval. We show that domain adaptation can be applied to boost the performance of this system through a novel piece-wise feature-space warping technique.

Third, we present a graph representation for VNs comprising multiple actions. We focus on the extension of our pose retrieval system to a sequence of poses interspersed with actions (e.g. jump, twirl). We show that our graph representation can be used for multiple applications: 1) to retrieve sequences of video comprising multiple actions; 2) to navigate in pictorial form, the retrieved video sequences; 3) to synthesise new video sequences by retrieving and concatenating video fragments from archival footage.

Key words: Computer Vision, Information retrieval, Computer Graphics.