

TexRad-Feedback plc - Cancer Management Imaging Software

Achieving Impact Award from the University of Sussex for their Industrial Informatics and Signal Processing Research Group

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The TexRAD Cancer management technology is being used as a research tool in seven of the G8 Countries; FDA and CE approvals for clinical use are imminent.

Project Summary

Research to address the detection of weak structured signals from within highly variable cluttered imagery is being used to identify textural variations in Computed Tomography (CT) X-ray images of organ tissue. The technology has been spun out into a company, TexRAD Ltd, that was recently taken over by Feedback plc, an AIM listed stock-market company. TexRAD uses novel image processing technology as a means of detecting tissue abnormalities, typically cancer, assessing response to treatment, and predicting patients' chances of survival. The detection process is being assessed via clinical research use in leading international Cancer research institutions using existing historical data in Europe, Asia and America. Regulatory approval for mainstream clinical use is imminent. Once regulatory approval has been gained TexRAD will be used for: cancer diagnosis, prognosis and treatment planning on current patients, which will save lives, generate a significant revenue stream and greatly increase the value of Feedback plc. TexRAD is Feedback's only product.

Commercialisation

One of the difficulties in creating products for medical application is the requirement for clinical trials, which are often prohibitively expensive. Our approach to this issue was to set up TexRAD Limited in order to sell our cancer diagnostic software to leading medical research laboratories. This has not only produced a revenue stream to support the company but has also resulted in the software being used in large independent clinical studies, which have been published in leading medical journals. This strategy has been very effective in enabling TexRAD to apply for FDA and CE approvals based on clinical trials that are funded by the users of the software. This approach also has the effect of marketing TexRAD to an international audience. UK based research users include: University of Cambridge; Royal Marsden Hospital ; University College London Hospitals; Royal Surrey County Hospital; Kings College; Brighton & Sussex University Hospitals; Mount Vernon Hospital; Velindre Cancer Centre. International research users include: **John Hopkins University (36 Nobel Laureates, 14 in medicine)** USA; Georgetown University Hospital USA; University of Mississippi USA; Massachusetts General Hospital USA; Scottsdale Clinical Research Institute USA; University of Wisconsin USA; Sunnybrook Health Sciences Centre Canada; Tata Memorial Hospital India; Aarhus University Hospital Denmark; European Institute of Oncology Milan; Oslo University Hospitals Norway; University of Rome "Sapienza" Italy; Universitatsspital Basel Switzerland; The Evangelische Lungenklinik Berlin Germany; University of Tokyo at the Institute of Medical Science Japan; Centre Hospitalier Universitaire De Reims France; Seoul National University Bundang Hospital Korea. As these institutions publish their results more research organisations are placing orders for the research version of the TexRAD software. Imaging Endpoints has purchased TexRAD; this US corporation works with some of the largest pharmaceutical and biotechnology companies conducting clinical trials and performing diagnostics on medical images. They are making extensive use of TexRAD for the assessment of CT images in connection with drug trials. A study will shortly be commenced of colorectal cancer patients (Stage IIIc) with either Regorafenib or Standard of Care (No Treatment) after adjuvant FOLFOX. The Sponsor is US Oncology Research and the Collaborator is Bayer Healthcare Pharmaceuticals, Inc./Bayer Schering Pharma. Feedback plc has signed a research agreement with the Oxford Stone Group at the University of Oxford & Oxford University Hospital NHS Trust ("Oxford") in Oxford, UK to investigate the potential clinical application of Feedback's TexRAD texture analysis software on CT image data of patients with kidney stones.

What the medical experts are saying about TexRAD:

"TexRAD software has allowed us to predict survival outcomes in several different tumors and treatment situations in a research setting. The data acquisition process and analysis has been streamlined for large studies, and the applications and support by TexRAD software engineers and leaders has led to some amazing results" - Andrew D. Smith M.D. Ph.D., Director of Radiology Research, Body Radiologist and Oncologic Imager Assistant Professor, University of Mississippi Medical Center.

"TexRAD is a very powerful software analytical tool that allows for in-depth evaluation of solid tumors for predictive, prognostic and treatment response categorization. We have used it in our Core Imaging lab on multiple occasions to help accelerate drug development for our pharmaceutical clients. It truly offers advanced information unlike any other technology in the field!" - Ronald L Korn MD PhD, CEO and Founder Imaging Endpoints Core Lab, Arizona

Dr. Ho-Young Lee, Assistant Professor in the Department of Nuclear Medicine, Seoul National University, College of Medicine, SNUBH commented, *"We are very excited with the prospects of using the TexRAD imaging research software platform in conjunction with the new PET-CT scanner being installed at our institution, further reinforcing our vision and reputation of being early adopters of new technologies, particularly in the fascinating area of quantitative imaging and its applications in cancer care."*

The recent sale of TexRAD to South Korea as part of the new PET-CT scanner installed by Siemens at Seoul National University Bundang Hospital, (SNUBH) is significant as Siemens (one of the market leaders for scanning machines) are now starting to bundle TexRAD software into their equipment sales.

The University has a significant shareholding in this company, at the time of writing its value was £4.1million. The value will increase greatly when FDA approval is obtained.

The Award



References: Background supporting the research

- [1] LS Jamal-Aldin, RCD Young, CR Chatwin, "Application of nonlinearity to wavelet-transformed images to improve correlation filter performance", 1997, *Applied optics* 36 (35), pp9212-9224, DOI: 10.1364/AO.36.009212
- [2] LS Jamal-Aldin, RCD Young, CR Chatwin, "Synthetic discriminant function filter employing nonlinear space-domain preprocessing on bandpass-filtered images," 1998, *Applied optics* 37 (11), pp2051-2062, DOI: 10.1364/AO.37.002051
- [3] S Tan, RCD Young, DM Budgett, JD Richardson, CR Chatwin, "Performance comparison of a linear parametric noise estimation Wiener filter and non-linear joint transform correlator for realistic clutter backgrounds", 2000, *Optics communications* 182 (1), pp83-90, DOI: 10.1016/S0030-4018(00)00796-3
- [4] B Ganeshan, KA Miles, RCD Young, CR Chatwin, "In Search of Biologic Correlates for Liver Texture on Portal-Phase CT", 2007, 14(9) *Academic radiology* 14 (9), pp1058-1068, DOI:10.1016/j.acra.2007.05.023
- [5] B Ganeshan, KA Miles, RCD Young, CR Chatwin, "Hepatic enhancement in colorectal cancer: texture analysis correlates with hepatic hemodynamics and patient survival", 2007, *Academic radiology* 14 (12), pp1520-1530, DOI:10.1016/j.acra.2007.06.028
- [6] B Ganeshan, KA Miles, RCD Young, CR Chatwin, "Texture analysis in non-contrast enhanced CT: Impact of malignancy on texture in apparently disease-free areas of the liver", 2009, *European journal of radiology* 70 (1), pp101-110, DOI: 10.1016/j.ejrad.2007.12.005
- [7] B Ganeshan, KA Miles, RCD Young, CR Chatwin, "Three-dimensional selective-scale texture analysis of computed tomography pulmonary angiograms," ,2008, *Investigative radiology* 43 (6), pp382-394, DOI: 10.1097/RLI.0b013e3181690091
- [8] K.A. Miles, B. Ganeshan, M.R. Griffiths, R.C.D. Young, C.R. Chatwin, "Colorectal Cancer: Texture Analysis of Portal Phase Hepatic CT Images as a Potential Marker of Survival", 2009, *Radiology* Vol. 250 (2), pp444-452, DOI: 10.1148/radiol.2502071879