Osteoarthritis Detection using Fractal Signal Analysis

- Validated detection of Osteoarthritis (OA) of the knee using Fractal Signal Analysis (FSA)
- Predicting the future development of OA

The Vision

- Accelerated OA drug development for early onset OA
- Improved performance of alternative treatments
- Assist insurers by predicting future rates of OA
- A unique service for patients and clinicians

OAISYS Inc. of Kingston, Ontario is joining forces with researchers at The University of Western Australia (UWA) to optimize the use of FSA in OA research and care. UWA has developed unique technology of FSA that allows detection and prediction of Osteoarthritis of the knee from standard X-ray images, while OAISYS contributes its expertise in precision analysis and arthritis grading of bone and joint images with reliable positioning technology to provide a unique and reliable new service.
Detecting Knee OA and following its evolution

FSA is based on measuring unique features of subchondral bone roughness and orientation with the following features:

- Measures quantifiable textural roughness and orientation
- Measurements are unaffected within a range of image noise, blur, exposure, projection angle and magnification
- Works with medical images regardless of source and complexity.

Radiograph of healthy bone        Radiograph of osteoarthritic bone

FSA detected Knee OA changes for patients who were with or without radiographic OA. (Ref. 1)
Prediction of future development of Knee OA demonstrated for patients who were without radiographic OA but with or without MRI cartilage defects. (Ref. 2)
Proposal for Development

UWA and OAISYS are seeking funding to pursue further development of four key areas of FSA:

- System limitations: Define limitations and fully develop the scope of applications.
- Image Optimization: Evaluate patient set-up and improve reliability.
- Software Developments:
  - Translate the code base from Matlab/C to Python/Java to increase usability
  - Implement automated image processing to improve efficiency.
- Clinical Studies: Evaluate FSA as a part of a comprehensive analysis of Knee OA initiation, progression and response to treatment.

Grant Funding Opportunity

The Australian Research Council offers linkage grants for research projects supported by industry as follows:

- To fund a 3 year research project of $525k a total industry cash contribution of $150k is required.
- Application deadlines are late October and April each year, with outcomes announced some 6 months later.

References:

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