

===== 平成28年度 第3回情報数理学セミナー =====

博士論文中間発表会 II

日時：平成28年5月19日（木） 13:00～15:00

場所：情報科学研究科 A棟1階 A109 講義室

講演者: Wu Hongle (沼尾研) 13:00～13:30

講演題目: Sleep Quality Self-assessment using Sound Data by Machine Learning

アブストラクト：

The quality of a good sleep is important for a healthy life. Recently, several sleep analysis products have emerged on the market; however, many of them require additional hardware or there is a lack of scientific evidence regarding their clinical efficacy. This paper proposes a novel method for discovering the sleep pattern via clustering of sound events. The sleep-related sound clips are extracted from sound recordings obtained when sleeping. Then, various self-organizing map algorithms are applied to the extracted sound data. We demonstrate the superiority of Kullback-Leibler divergence and obtain the cluster maps to visualize the distribution and changing patterns of sleep-related events during the sleep. Also, we perform a comparative interpretation between sleep stage sequences and obtained cluster maps. The proposed method requires few additional hardware, and its consistency with the medical evidence proves its reliability.

In the next phase of the study, we will work on the study of data from several nights, to find out the differences between various sleep patterns and build a model to assess the sleep quality. Furthermore, detecting the sleep stages transition online through the dynamic of cluster map is another topic. Also, we will try to find a method to automatic generating a heat-map of sleep-related events to visualize the distribution and their affection degree to the sleep quality.

=====

講演者: 金岡 祐介 (谷田研) 13:30~14:00

講演題目: イメージセンサの技術動向と電着法を用いたマイクロレンズ

アブストラクト:

近年、微細加工技術の発展とモバイル端末における高画質化の要求から、イメージセンサの画素密度は向上し続けている。高画素密度化はイメージセンサの解像度を向上させる一方で、受光面積の減少による受光量低下を引き起こしている。最新のイメージセンサは、裏面照射構造や光導波路等の採用によって、イメージセンサが受光する光量の低下を抑えているが、より一層のセンサ構造の改善が求められている。

一方、トリリオンセンサやIoTが注目され、多量のセンサがネットワークに接続される社会を実現するための取り組みが始まっている。これらによる技術動向として、イメージセンサに対してさらなる低コスト化や高機能化が求められている。低価格化や高機能化を達成するために、従来のレンズと比べ簡素なレンズを採用し、信号処理による歪補正や、セキュリティ用途向けに赤外画像および距離画像を取得する取り組みが進められている。このように、イメージセンサの進化はハードウェアとソフトウェアの両方面から取り組まれている。

本報告では、イメージセンサの技術動向を整理し、今後のイメージセンサに求められる技術的課題から、現在取り組んでいる電着法を用いたマイクロレンズ作製技術の意義を明確にする。

=====

講演者: Sopchoke Sirawit (沼尾研) 14:00~14:30

講演題目: Beyond Similarity: Serendipity Music Recommender Systems

アブストラクト:

People are increasingly overwhelmed by information available online channels, which seem to provide ample choices. It has become more challenging for people to find the choice that will perfectly satisfy their needs. In addition, some may have insufficient experience to make right decisions. Hence, it becomes necessary to have a tool which can scope or screen choices for the users or suggest other alternatives that users do not even know that they exist. With this tool, user will have more chances to make a better

decision or select a better choice. Such tool is known as “Recommender Systems”.

In developing a recommender system, the traditional techniques including content-based and collaborative filtering are commonly used. Both techniques assume that users want to see the content that is similar to what they already rate highly (content-based) or similar to the content their friends rate highly (collaborative filtering). With these techniques, users are locked into the clusters of similarity with no or low chances of discovering things that are truly novel to them. The recommendations might be boring since they are too predictable, especially for the music recommender system. The recommended music is basically similar to the previous set of music in users’ activities either based on music contents or music context.

To broaden the choices, increase the chances for users to discover music that are unexpected and truly novel and to open up a whole new musical universe to users, the notion of “serendipity” has been recently proposed. However, to generate an unexpected recommendation list in most existing algorithms require user interaction. We, therefore, propose a more flexible model for serendipitous music recommendations by combining the incorporated data from different aspects or different levels. We use ProbLog, the probabilistic logic framework, to implement and test a serendipitous music recommendation inspired by bisociative knowledge discovery.

=====

講演者: **山口新吾** (森田研) 14 : 30~15:00

講演題目: 品質工学における基本機能の数理的基礎付け(基本概念)

Mathematical basis for the Generic Function in Quality Engineering
(The Basic Concept)

アブストラクト :

モノづくり (設計から製造) における機能の評価と改善を研究する品質工学の重要概念の一つである基本機能は、従来、技術者の力量に依存し合理的な根拠が曖昧であった。この課題を解決する為、最小作用の原理と回路論を統合した新方法論を考案した。今回、簡単

な機械システムで新方法論の可能性を確認した。