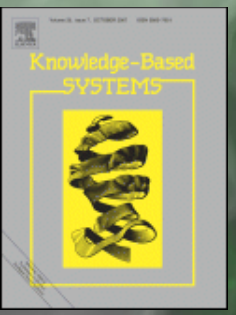
16th IEEE International Conference on Computational
ntelligence and Informatics, November 19-21, 2015

Risks-Forcast@People-in-Clouds:
Big data based Clouds Healthcare and Risk Forecasting based on Subjective Intelligence



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- Top three challenge health
- Trained resource
- Regional healthcare balance
- Health care cost

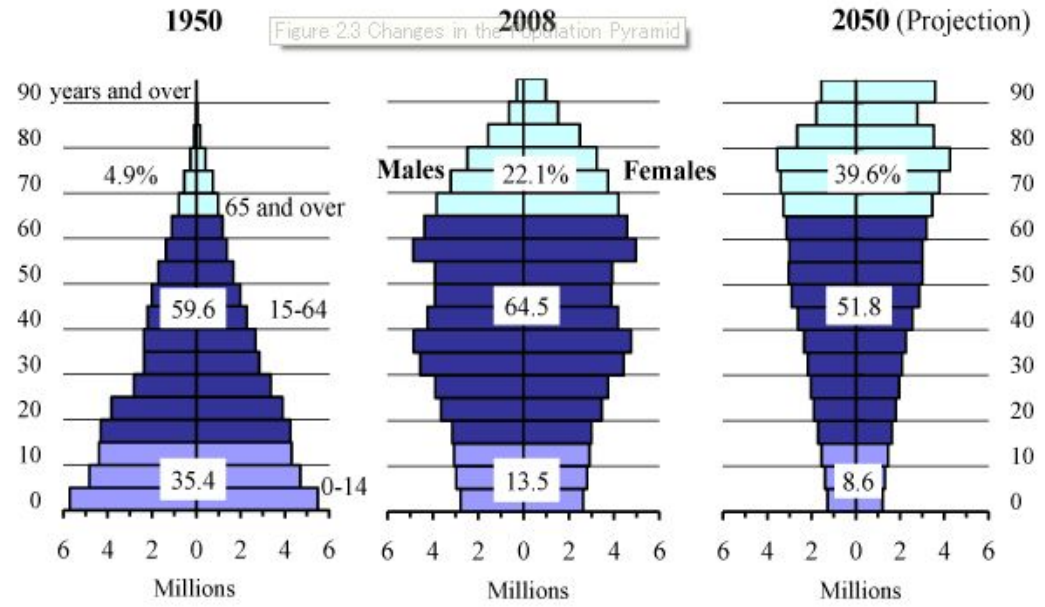
- Opportunities: medical tourism, day care surgery, specialty hospitals, private medical insurance, and health IT
- Health care to be double to 68.4RM in 2018.
- Asia Pacific Health Market: RM 1.14 Trillions, in 2012
- To become RM2.32 Trillions 2018.

TOPIC : EU-Japan cooperation on Novel ICT Robotics based solutions for active and healthy ageing at home or in care facilities

http://www.soumu.go.jp/menu_news/s-news/01tsushin04_02000058.html
EU side:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2433-sc1-pm-14-2016.html

http://www.bloomberg.com/news/2012-09-13/aging-baby-boomers-face-losing-care-as-filipinos-go-home.html

Changes in the Population Pyramid



Source: Statistics Bureau, MIC; Ministry of Health, Labour and Welfare.

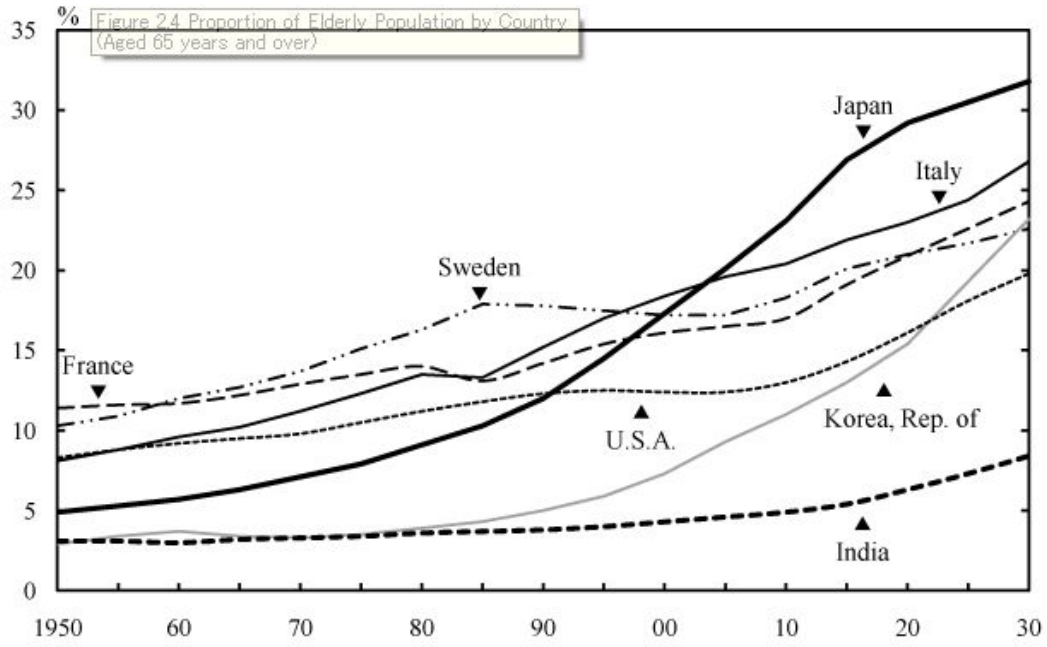
The proportion of the population 65 and over has doubled from 10% in 1985 to 20% in 2005, and is projected to be 30% in 2023 [2006, NIPSSR].

In June 2006, the Diet (Japanese Congress) passed a comprehensive package of reform to make the delivery system more efficient. First, the average length of stay in hospitals is to be decreased. To achieve this goal, the number of long term care (LTC) hospital beds will be reduced from the 2006 level of 380,000 to 150,000 by the end of fiscal year 2011 and converted to LTC Insurance facility beds and assisted living [Leflar, 2005].

Need to have a system that participate to provide medical doctor with a support

helping physicians to manage the diagnosis procedure using the same knowledge that physicians have by copying (mimic) his/her style, mentality, diagnosis routines and medicine recipes.

Proportion of Elderly Population by Country (Aged 65 years and over)



Source: Statistics Bureau, MIC; Ministry of Health, Labour and Welfare; United Nations.

It is not replacing the physicians

The system helped as well to mental health solution and mobile technology.

The number of *Taiwan's* 65 plus residents had risen to account for 10.7% of the total *population* by the end of 2010 (estimated as 19.1% 2030)

- Decision making reasoning on new theories and techniques, statistical objective approaches
- Social networking issues, securities, global inter cultural in trading, business other many criteria dominate quality and optimization.
- This is make many techniques not suitable: curse of dimensionality, concept analysis alignment, different data in DM, multi-criteria statistical models limitation, feature extraction rough set issue, and etc..,

Big data

- Today, data is accumulating at tremendous rates
  - click streams from web visitors
  - supermarket transactions
  - sensor readings
  - video camera footage
  - GPS trails
  - social media interactions
  - …
- It really is becoming a challenge to store and process it all in a **meaningful** way

Big Data technology =>create user profiles, monitor social behavior, provide decision support based on social trends or discover new service providing opportunities.

The objective of this keynote is to highlight new research directions in providing services granules represented in Cloud Semantics based on IoP (internet of People) preferences.

Needs:

- The impact of big data on preferences extraction, providing knowledge to **program** (eg., **Robotics)** about human needs, inferred from the clouds, fitting to programming machine suitable for **subjective needs**.
- This is to involve **decision making** based on big data for real-time **knowledge acquisition** on **subjective** task handling.

The promise of Big data

- Data contains information of great business value
- If you can extract those insights you can make far better decisions
- ...but is data really that valuable?

How Companies Learn Your Secrets

By CHARLES DUHIGG FEB. 16, 2012

Andrew Pole had just started working as a statistician for Target in 2002, when two colleagues from the marketing department stopped by his desk to ask an odd question: "If we wanted to figure out if a customer is pregnant, even if she didn't want us to know, can you do that? "

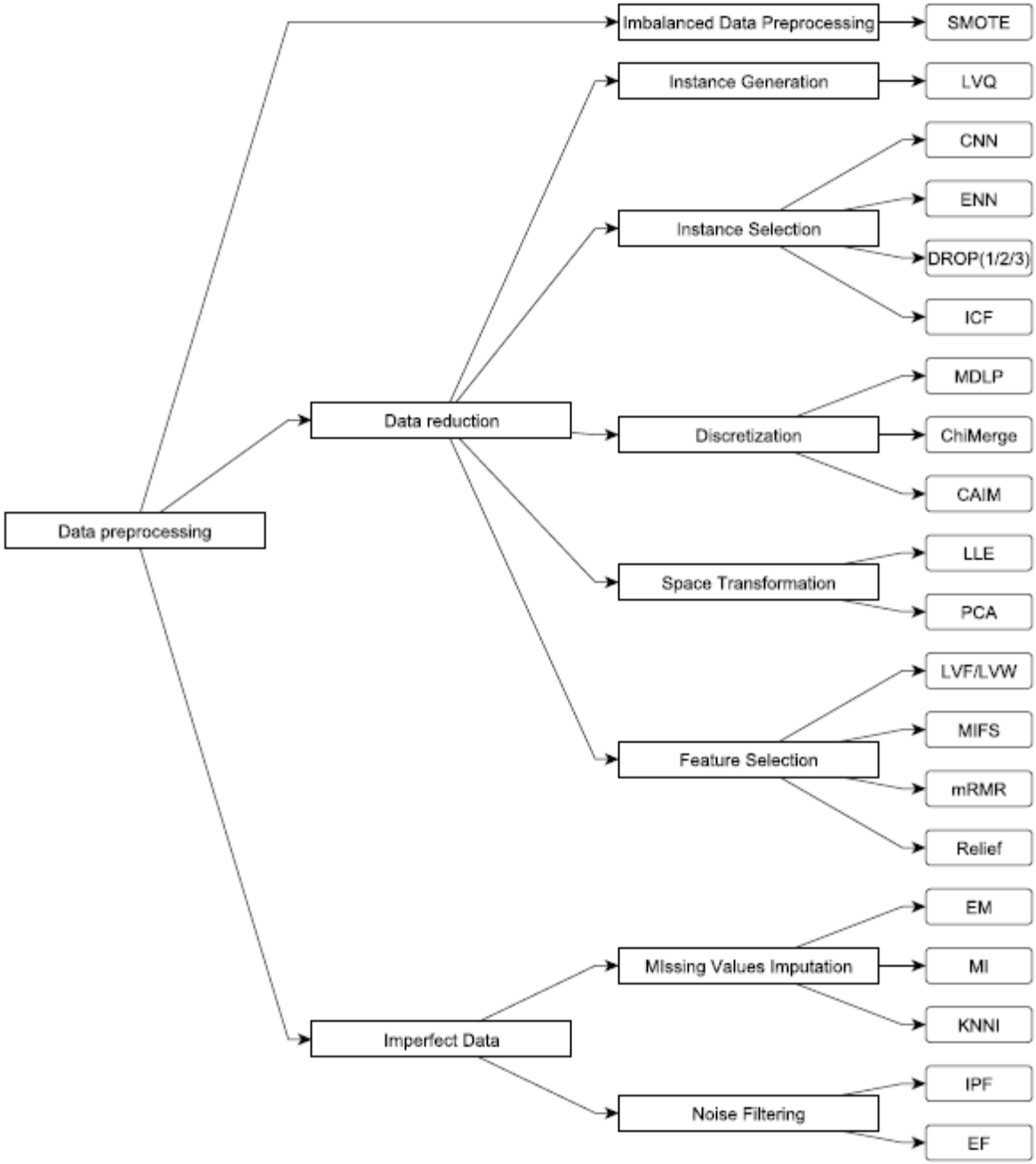
Pole has a master's degree in statistics and another in economics, and has been obsessed with the intersection of data and human behavior most of his life. His parents were teachers in North Dakota, and while other kids were going to 4-H, Pole was doing algebra and writing computer programs. "The stereotype of a math nerd is true," he told me when I spoke with him last year. "I kind of like going out and evangelizing analytics."

Antonio Bolfo/Reportage for The New York Times

http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?_r=0

- dimensionality reduction->feature selection
- feature construction and feature selection
- construction methods complement the human expertise to convert “raw” data into a set of useful features; (preprocessing)standardization, normalization, discretization,signal enhancement, extraction of local features,
- Feature selection is the process in which the number of initial features is reduced and a subset of them that retain enough information for obtaining good, or even better, performance results is selected.

- which aim at reducing
- the complexity of the data, detecting or removing irrelevant and noisy elements from the data through feature selection, instance selection or discretization processes.


Data preprocessing
Imbalanced Data Preprocessing
SMOTE
Data reduction
Instance Generation
LVQ
Instance Selection
CNN
ENN
DROP(1/2/3)
ICF
Discretization
MDLP
ChiMerge
CAIM
Space Transformation
LLE
PCA
Feature Selection
LVF/LVW
MIFS
mRMR
Relief
Imperfect Data
MIssing Values Imputation
EM
MI
KNNI
Noise Filtering
IPF
EF

- Data pre-processing reduce multi-dimensionality
- Feature extraction (dataset generations)
- Feature Selection
- Image classification, face recognition and text classification; (feature selection for big data)
- Feature selection: to be tested again multiple classifier
- Many-algorithms versus many databases
- Many-algorithms versus single database
- single-algorithm versus many databases
- single-algorithm versus single database

- Noise filtering
  - Robust learners
  - Data polishing methods
  - Ensemble filters (based on sampling method)

We need to construct ensemble learning model to learn from Data by MUTIPLE CLASSIFIER SYSTEMS (MCS)

- Data Reduction
  - Feature Selection
  - Space transformation
  - Manifold learning

- Discovering useful pattern in a database in DM
- Frequent pattern mining
- Weighted frequent pattern]high utility pattern mining

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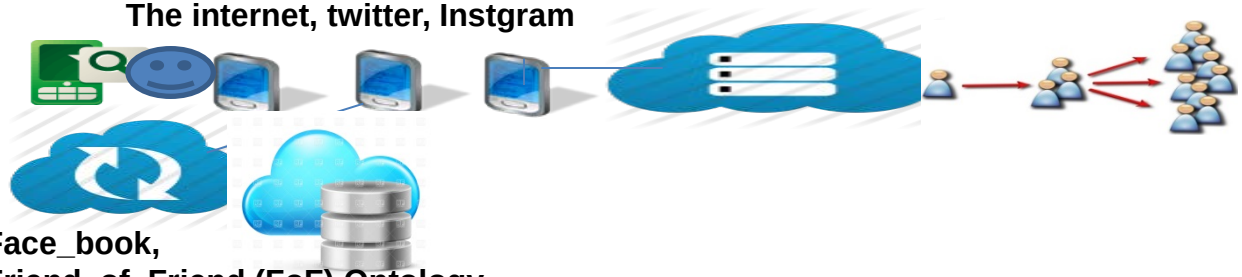
Title: Knowledge-Base Granules of Decision Support Systems Infra Service Provider based on Acquisition from Big data

The internet, twitter, Instgram



information filtering and System fusion,

Face_book,
Friend_of_Friend (FoF) Ontology,
Trust based on Word_of_Mouth (WoM) (negative and Positive)
Sentimental analysis and opinion mining

IoP

To make the cloud

IoT

Health Cloud

Crisis Cloud

Reasoning based on expert Knowledge and big Dat

Big data migration and metadata evolution,

Reasoning based on expert Knowledge and big ata

Health Care service

Crisis (risk) support service

Using common resources like doctors, hospitals, ambulances etc.

Health Care support system

Crisis estimation and support System

Advancing active and healthy ageing
Early risk detection
Knowledge health data improving diagnosis
EHealth Interoperability
VDS+ (Advanced VDS!!)

Shared Resources and logistics used in health care and risk support: Digital Laboratory and health data

Crises prediction system
Digital privacy
Early warning system

!!VDS is a system developed by Japan Unit (supported by SCOPE project) and extended by the Italian group.

- granular computing models, as service provider
- Rough set, fuzzy sets, probabilistic rough sets, covering rough sets, neighbourhood rough sets (NRS), provide: heterogeneous feature subset selection, neighborhood cover reduction for rule learning, different neighbourhood rough set to different granular of feature ranks.
- Relation matrix represents the neighbourhood relations which specify the similarity among objects based on distance Object close to neighbourhood granules are close to each other. Different granules would specify the relations between references points.
- Granular alignment in relation to reference points, This is to align one granular in relation to reference points: aligning neighbourhoods in relation to features, such that to find the equivalence relations among features of each neighbourhood: This would contribute in attribute merging as time series.

  Then to provide an optimization to extract the threshold values align all granules (i.e, neighbourhood) to provide situated optimal gain. The subjectiveness would be used as tuning parameters that aligns neighbourhood in relation to objective features.

The main issues

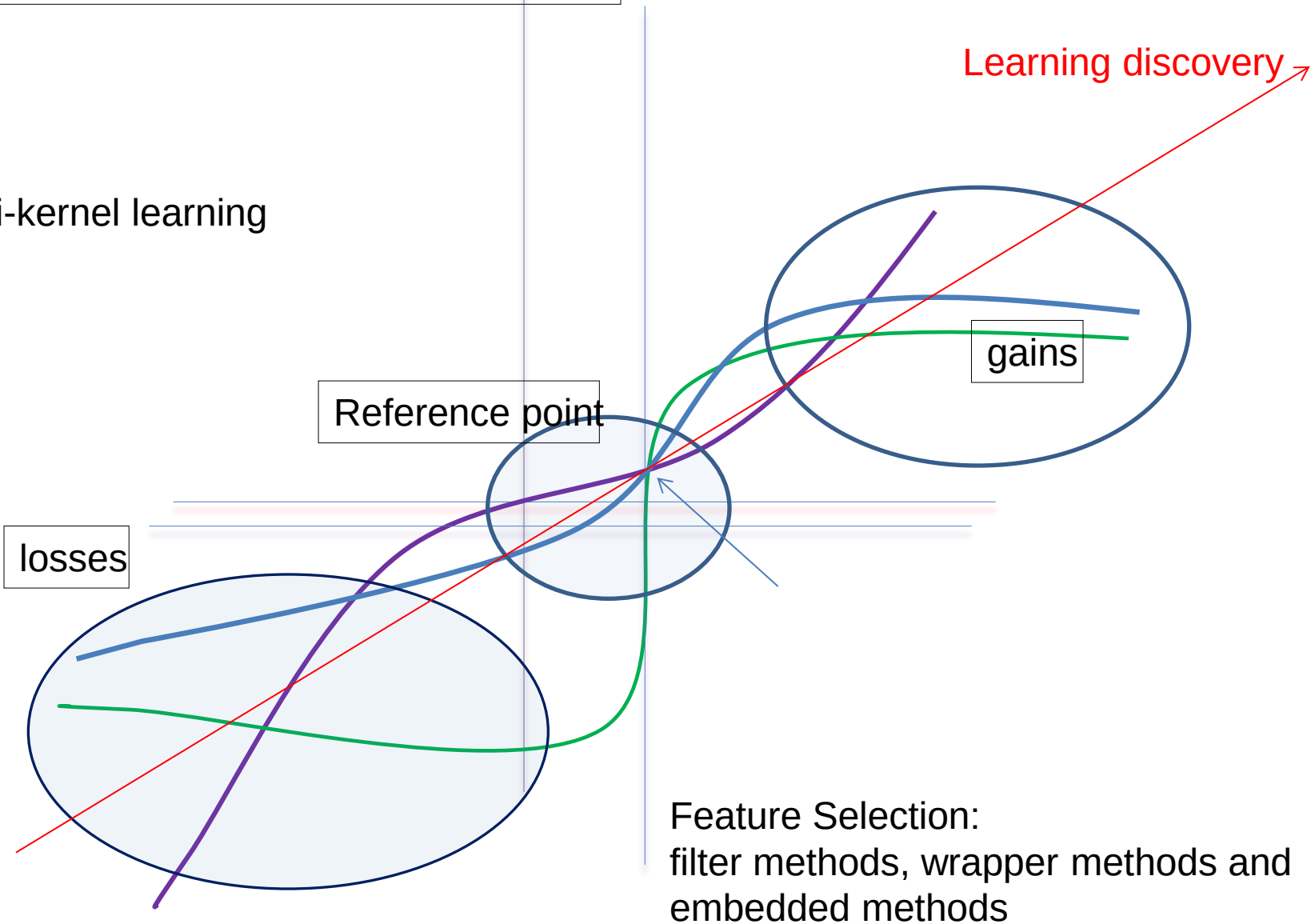
- To provide view on computational intelligence in looking to *subjective* criteria
- To provide a system that can provide instant access without typing searching-Prediction based on text, voice and images analysis (feature extraction)
- Apply the technology to medical application
- Utilizing big data, to provide clouds, IoT, IoP, IoH, IoCsis. **bigdata@people.in.clouds**
- Provide DSS that use these clouds for medical service, and risk prediction

Subjectivity extraction

- lexical level semantic orientation depending on natural language context: language properties, domain pragmatic knowledge, human psychology, collaborative filters
- Most **MCDM** cannot capture the **subjective behaviours** of DM. (it is based on complete rationality). aspiration
- For example in Prospect theory, (Kuhneman, Tversky), can provide subjectivity from the outcome (a transaction or utility we expect or receive),
- Stochastic dominance may provide an estimation to reference point in prospect theory(Tversky, Kahneman). However, in theory this is not yet feasible, but possible combination may provide a good approach. Deriving reference point from profile and preference data, (herd behaviour) Sequential DM (Information Cascade)

Learning: is also subjective
Multi-objective : define Pareto fronts
In
Relation to two objective functions

Ensemble learning,
Learning: multifold,
wrapper



Feature Selection:
filter methods, wrapper methods and
embedded methods

In big data
This is not easy!
And expensive

- Supervised
  - we have training data with correct answers
  - use training data to prepare the algorithm
  - then apply it to data without a correct answer
- Unsupervised
  - no training data
  - throw data into the algorithm, hope it makes some kind of sense out of the data

Data mining methods for features selection of big order)

Filter methods that select variables by ranking them with information generated from data, such as relative entropy and absolute value two-sample t-test with pooled variance estimate.

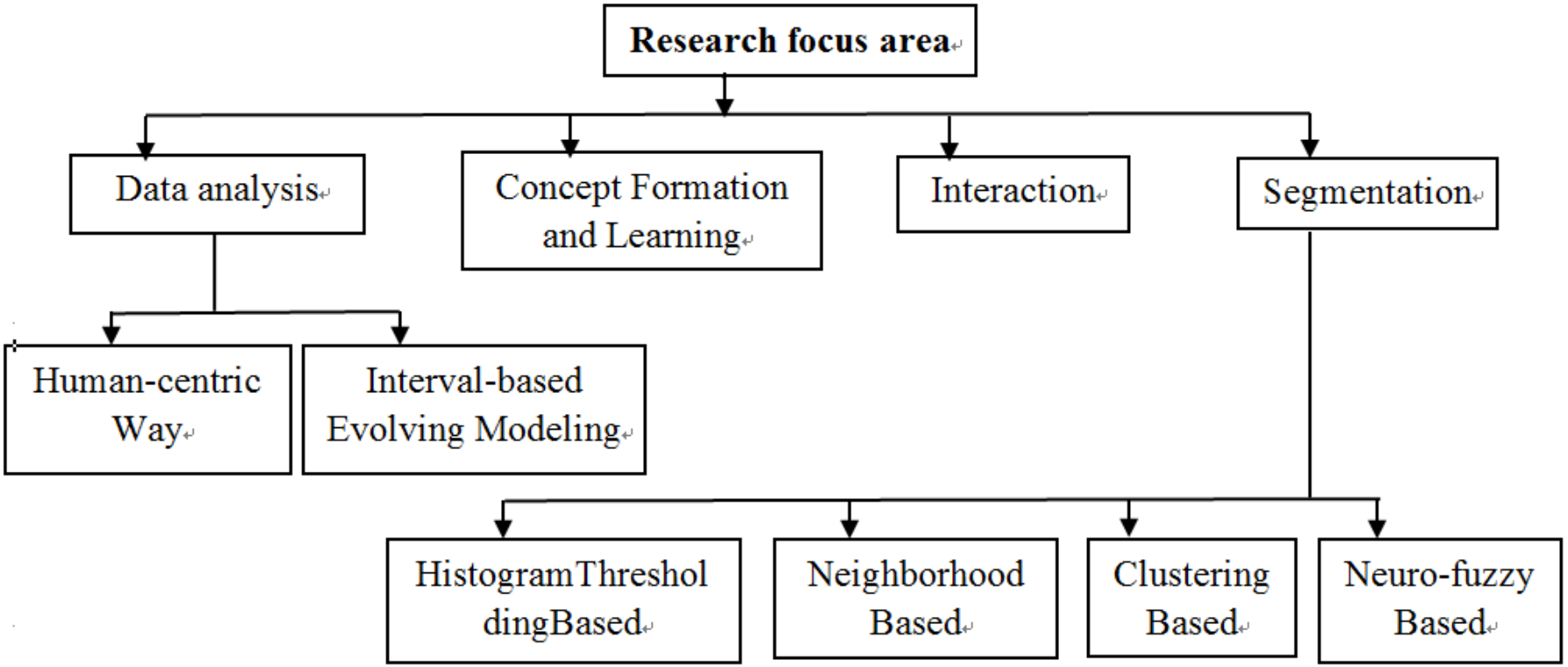
Wrapper methods that assess feature subset according to their performance to a given model.

This contains a searching procedure to **search the space of possible feature subset** and evaluate each subset in terms of the performance of the given model on the subset. If there are **20 features**, the number of different feature subset will be 2^{20} -1 (the null subset is excluded). The practical computation time taken in exhaustive searching is always unacceptable, (high classification efficiency and accuracy)

heuristic searching methods, such as simulated annealing, genetic algorithms, and tabu search are better alternatives.

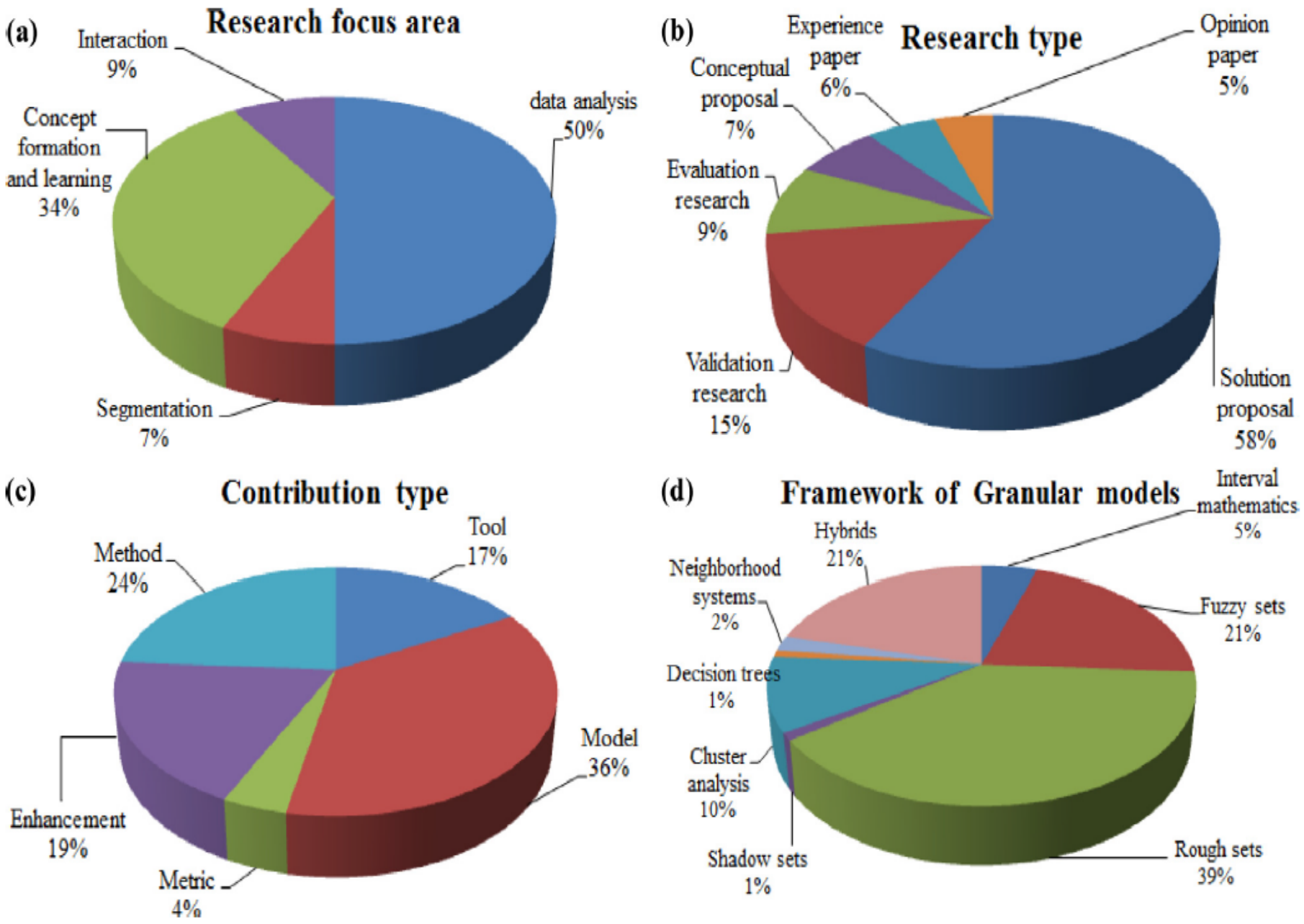
Embedded methods, which incorporate features selection as part of the training process of the model, such as the **Least Absolute Shrinkage** and Selection Operator (Lasso) method for contrasting a linear model.

Granular Computing Research gaps and recommendations for further studies in



Research focus area categories in GrC

Saber Salehi, Ali Selamat, Hamido Fujita
Systematic mapping study on granular computing,
Knowledge-Based Systems Volume 80, Pages 78-97 (May 2015)



Distribution of (a) research focus area, (b) research type, (c) contribution type and (d) framework of granular model.

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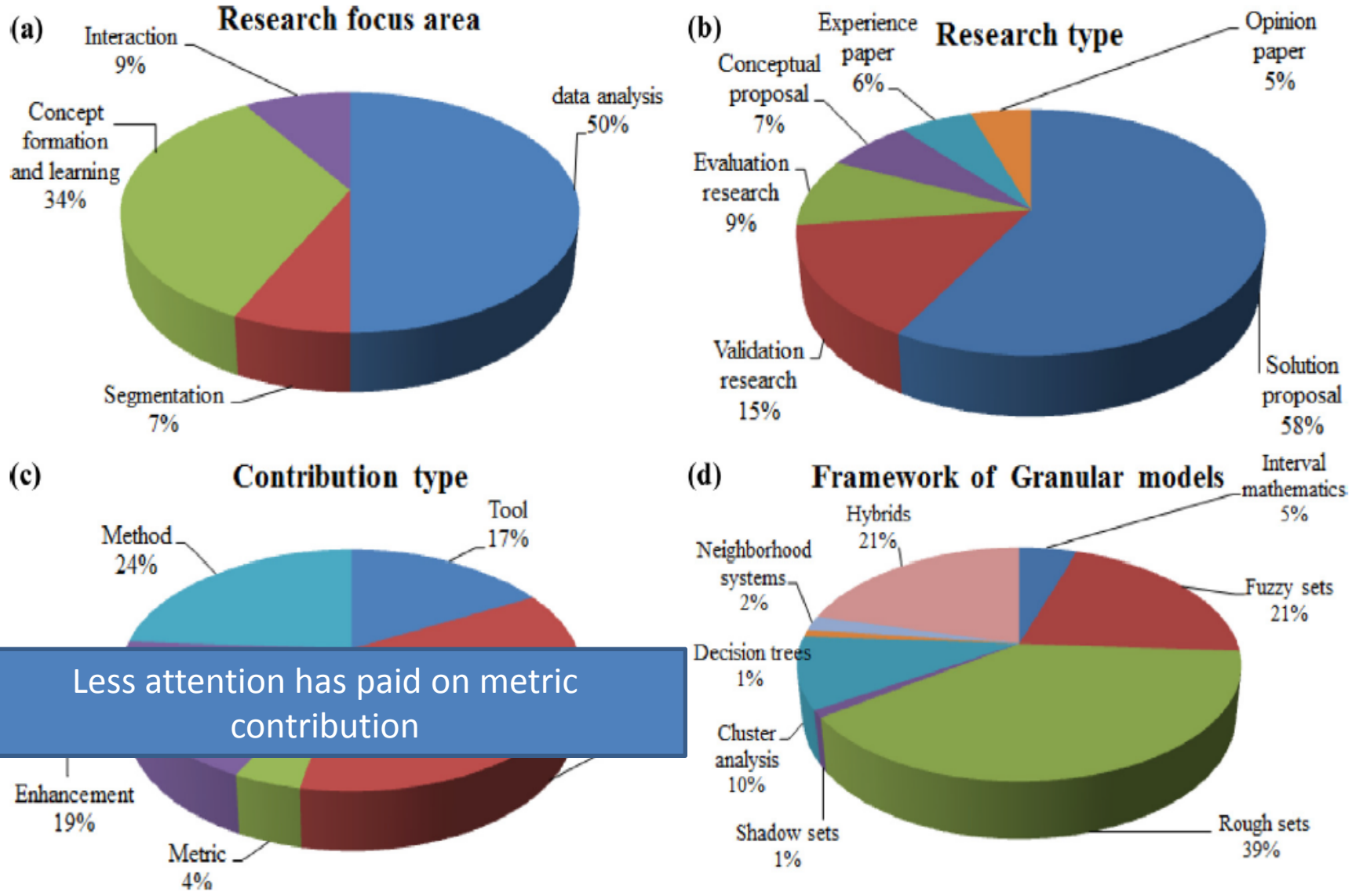

Less attention has paid on metric contribution

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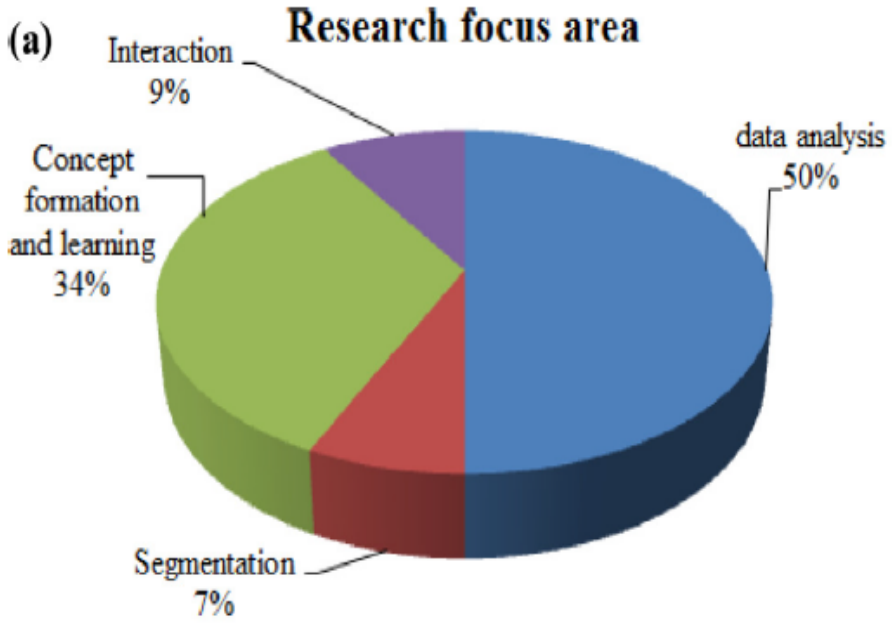

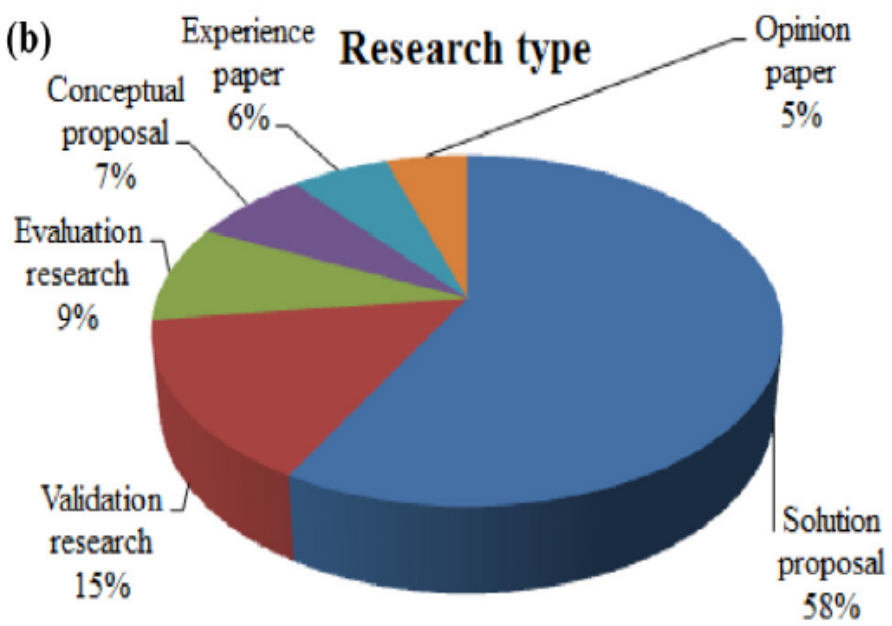

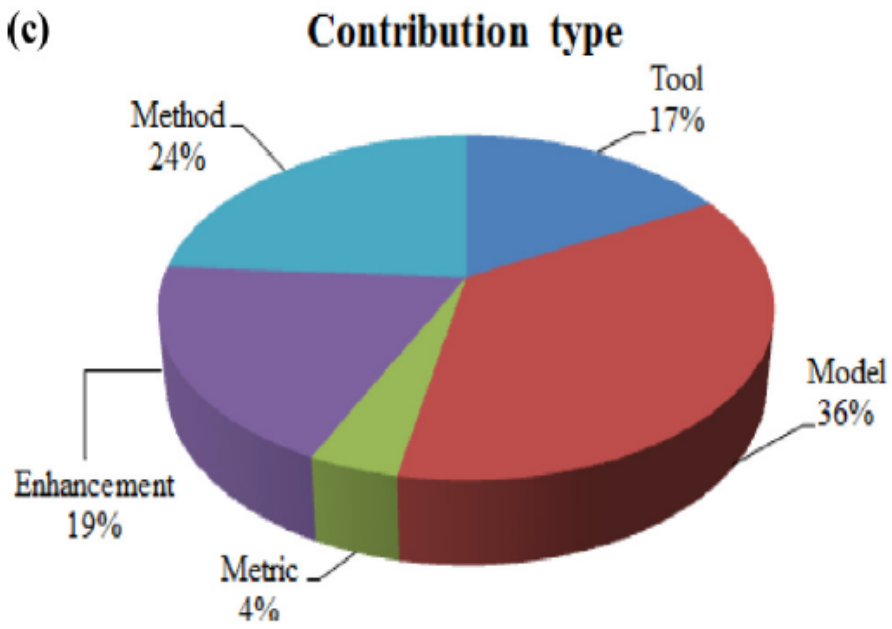

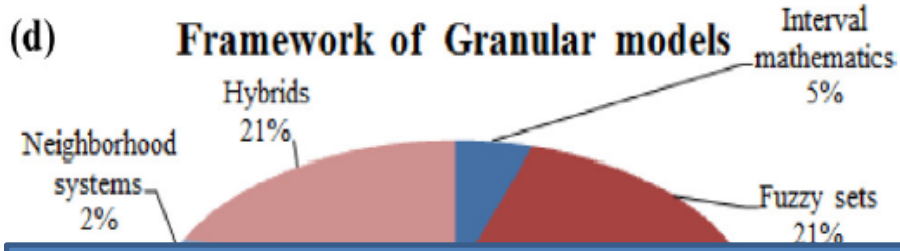

- Less attention has paid on decision trees, shadow sets, neighborhood systems and interval mathematics
- Further research into possible cluster analysis to discover certain category of granular classifiers

Distribution of (a) research focus area, (b) research type, (c) contribution type and (d) framework of granular model.

- Cooperative clouds, policies and securities
- Sentimental analysis prediction and subjective criteria of IoP, user preferences extracted from Social Network trust based decision making models for decision making processes and consensus processes in Social Media exploiting the preferences and opinions and data from social networks.
- Structure of the cloud based big data context and the most representative crisis evaluation decision
- Data source clustering schemes or classification of data sources by attributes
- Virtual Doctor System (example) in the clouds; as service using IoH for health provider system based on Virtual Doctor System developed by the speakers.

- The objective is to apply IoT to provide a pervasive service for two directions (health care and risks and disasters) analysis that are overlapping in its resources, (hospital, practitioners, health management, early warning systems etc.,). Also to develop generalization-based strategies to protect clouds privacy from composition attack
- The project use research milestones on Ensemble learning and classifiers based on machine learning for patterns related to health, like heart disease, or driving problems due to subjective mental situation, or risk analysis in earthquake situation in specific area based on spatial analysis, and social networking analysis. Knowledge is extracted from big data by categorization based on parallel ensemble learning modular classification.

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Attributes involving is decision making:

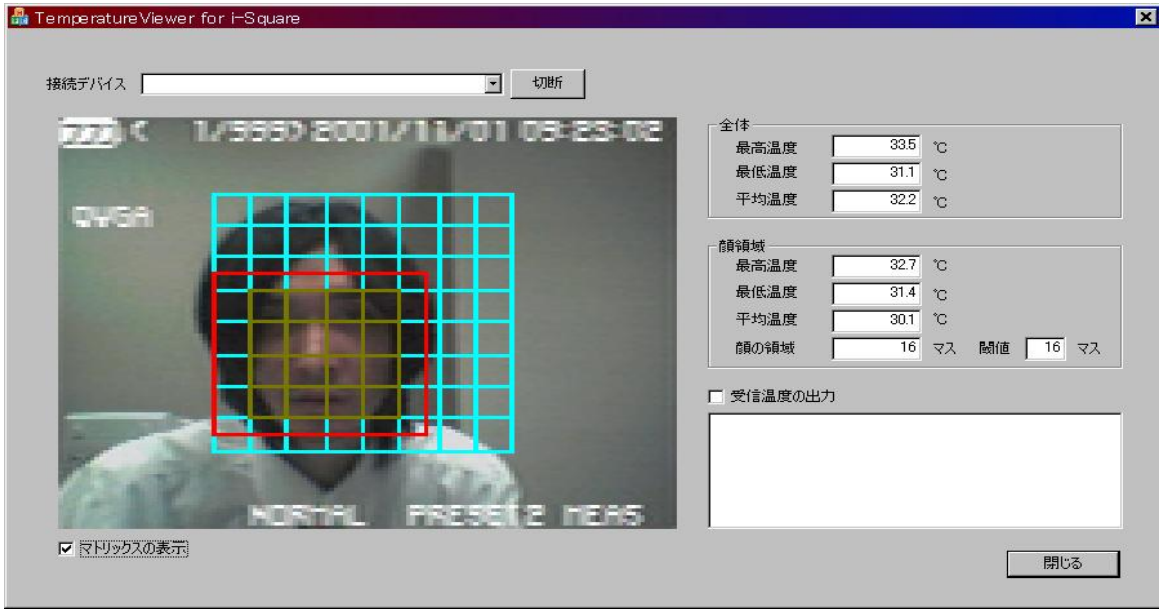
- Features points on the face and their articulation related to universal template
- Voices (pitch and power)values.
- Heart rate (heart rate sensor)
- Respiration rate (respiration rate sensor)
- Patient body orientation (directions)

Microsoft's Kinect Camera

EMOTIV: EEG-based Brain-Computer Interface

ENPATHIA HEAD MOUSE


SCOPE
バーチャル・ドクター・システム研究開発
岩手県立大学ソフトウェア情報学部藤田研
問診を開始します。開始と書かれている
部分をタッチしてください。
開始



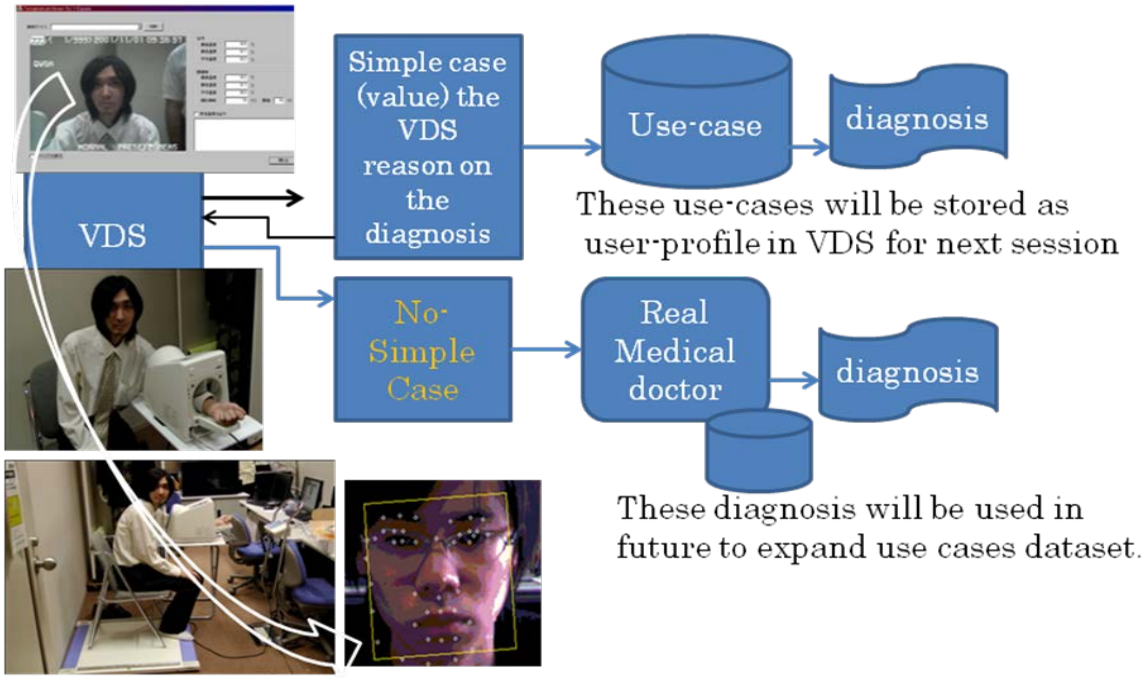


Figure 10: The physical ontology and VDS related simple case

Conclusion

Impact of Subjective Intelligence on providing **fitness** and **appropriateness** justification to users habits, mental stated and other criteria that collectively rank the objective criteria in flexible manner based on preferences.

To provide in the cloud knowledge-based systems that can project using new granular based data mining, feature extraction to provide a reasoning project on different situations on the ground

For new generation of healthcare system and risk analysis.

Thank you for your participation and attention

- Questions comments are welcome
- If not then we may chat at coffee breaks or else. Email: Hfujita-799@acm.org