第二届信息技术与不确定性数学理论与方法研讨会

会议程序册

陕西·杨凌

2022 年 4 月 16 日

主办单位：西北农林科技大学

承办单位：西北农林科技大学理学院

会议日程安排

<table>
<tr><th colspan="4">4 月 16 日 上午 8：00-12：00</th></tr>
<tr><th>时间</th><th>事项</th><th>地点</th><th>主持人</th></tr>
<tr><td>8：00-9：00</td><td>开幕式
1. 主持人介绍到会嘉宾和会议筹备情况；
2. 参会代表线上合影；
3. 武汉大学胡宝清教授致辞；
4. 报告 1. 工作汇报和研究方向
胡宝清
武汉大学</td><td rowspan="2">腾讯会议：
213-246-040</td><td>西北农林科技大学
杨斌</td></tr>
<tr><td>9：00-9：40</td><td>报告 2. Ranking fuzzy numbers using additive priority degrees
马振明
临沂大学</td><td>武汉大学
胡宝清</td></tr>
<tr><td>9：40-10：00</td><td colspan="3">茶歇</td></tr>
<tr><td>10：00-10：40</td><td>报告 3. 基于线性变换的粒结构的信息粒度研究
杜文胜
郑州大学</td><td rowspan="3">腾讯会议：
213-246-040</td><td rowspan="3">武汉大学
胡宝清</td></tr>
<tr><td>10：40-11：20</td><td>报告 4. 模糊蕴涵关于重叠与群组函数的区间值推广及分配性方程
曹朦
武汉大学</td></tr>
<tr><td>11：20-12：00</td><td>报告 5. Lifting associative operations on subposets of a complete lattice
但业星
西南交通大学</td></tr>
</table>

4 月 16 日 下午 14：30-18：00			
时间	事项	地点	主持人
14：30-15：10	**报 告 6.** On the cross-migrativity between uninorms (nullnorms) and overlap (grouping) functions 朱宽云 长江大学	腾讯会议： 376-719-447	武汉大学 胡宝清
15：10-15：50	**报告 7.** Constructions of quasi-overlap functions and their generalized forms on bounded partially ordered sets 乔军胜 西北师范大学		
15：50-16：00	茶歇		
16：00-16：40	**报告 8.** 模糊差算子及其在图像处理中的应用 方博闻 武汉理工大学	腾讯会议： 376-719-447	武汉大学 胡宝清
16：40-17：20	**报告 9.** 二型聚合函数基于扩展原理的构造与表示问题 张炜 西南财经大学		
17：20-18：00	**报告 10.** On three types of L-fuzzy β-covering-based rough sets 李薇 西北农林科技大学		

- **报告 1**

报告题目：工作汇报和研究方向

报告人：胡宝清 教授，武汉大学

- **报告 2**

报告题目：Ranking fuzzy numbers using additive priority degrees

报告人：马振明 教授，临沂大学

摘　要： In this paper, we propose a novel method for ranking fuzzy numbers based on additively consistent fuzzy preference relations. We introduce the so-called additive priority degree to capture pair-wise comparisons of fuzzy numbers. This measure is both separable by taking a suitable parameter in weight function and able to induce an additively consistent fuzzy preference relation. Then, a ranking procedure is developed to compare different fuzzy numbers with a total order. The proposed method combines all the pointwise comparisons of different fuzzy numbers with a strictly increasing weight function, and hence not only shape characteristics and relative positions of fuzzy numbers, but also their importance is involved. Numerical examples show the differences of the proposed method compared to the previous approaches.

- **报告 3**

报告题目：基于线性变换的粒结构的信息粒度研究

报告人：杜文胜 副教授，郑州大学

摘　要：粒计算是一种构建、描述和处理信息或知识的计算范式。根据论域上的二元关系，论域分为各种类型的信息粒。知识结构由与粒化对应的关系所诱导的信息粒组成。本报告为度量知识结构的信息粒度建立新的理论框架。首先，通过 Boolean 矩阵，引入知识结构之间的新型两种关系：粒相等关系和粒精细关系。然后，证明了粒精细关系为简化知识结构上的偏序，并用 Hasse 图进行表示。随后，提出了信息粒度的公理化定义，其中不变性和单调性基于这两种关系。另外，给出了信息粒度的一般形式，并证明了现有的一些度量是其特例。最后，作为应用，提出了基于信息粒度的属性重要度。

● 报告 4

报告题目：模糊蕴涵关于重叠与群组函数的区间值推广及分配性方程

报告人：曹朦 博士，武汉大学

摘　要：作为经典逻辑联结词布尔蕴涵的推广，模糊蕴涵在模糊集合理论的诸多分支中发挥着关键的作用。构造和刻画新的模糊蕴涵模型及研究其分配性方程一直是近些年的研究热点。报告主要介绍了了基于两类新兴的非必要结合性二元聚合算子重叠函数与群组函数的模糊蕴涵区间值推广及分配性方程。

基于三角模与三角余模生成的模糊蕴涵主要包括 R-、(S,N)-、QL-与 D-蕴涵，这四种经典构造方法具有深厚的理论背景，所以对它们进行推广成为了构造新模糊蕴涵的不二之选。目前，常用的推广方法有以下两种：一是利用其他聚合算子取代三角模与三角余模，如重叠函数与群组函数；二是将其定义域与值域推广到更为一般的模糊集上，如区间值模糊集。在报告的第一部分，考虑将由重叠与群组函数生成的模糊蕴涵，R_O-蕴涵与由三元组(O,G,N)生成的 D-蕴涵，推广到区间值模糊集上，得到了区间值 R_O-蕴涵与区间值(G,O,N)-蕴涵。进而对它们的代数性质、与区间值自同构的关系、与其相应单位区间上的模糊蕴涵的关系进行了分析。同时，讨论了四种基本的由区间值重叠函数与区间值分组群组函数生成的区间值模糊蕴涵，即区间值 R_O-、(G,O,N)-、(G,N)-与(O,G,N)-蕴涵的交集。

分配性方程的提出为降低模糊“IF-THEN”规则的复杂性提供了一种有效的策略。因此，分配性方程的求解得到了学者们的广泛关注。目前，常见的求解思路有以下两种：一是给定聚合算子，求解模糊蕴涵；二是给定模糊蕴涵，求解聚合算子。在考虑 I 为序和蕴涵的条件下，分配性方程的聚合算子解通常也表现出序和的结构。在报告的第二部分，讨论了两种基于重叠函数序和结构定义的序和蕴涵关于重叠函数与群组函数的分配性方程。具体来说，根据序和块中 I_k 是否满足左单位元性(NP)对指标集合 K 进行了分类，进而刻画了这两种序和蕴涵满足四种分配性方程的重叠函数或群组函数解。同时，给出了四种分配性方程成立的充要条件。

● 报告 5

报告题目： Lifting associative operations on subposets of a complete lattice

报告人： 但业星 博士，西南交通大学

摘　要： We present the uplift of a binary operation on a subposet of a complete lattice as a generic way of extending this operation to the entire complete lattice. It involves the use of a set-valued mapping between that complete lattice and the subposet. We show that the uplift of a binary operation is increasing when this set-valued mapping is increasing, and that it is a proper extension when the given binary operation is also increasing and the set-valued mapping satisfies an additional natural condition. If some technical cofinality condition is met, then uplifting also preserves associativity. Moreover, if we consider a canonical set-valued mapping, then the uplift of a t-subnorm on a subposet is a t-subnorm as well. It is then easy to modify the uplift of a t-norm on a bounded subposet to turn it from a t-subnorm into a t-norm. Several existing t-norm construction methods turn out to be instantiations of this (modified) uplifting process. Finally, we formulate the dual results on the downlift of a binary operation.

● 报告 6

报告题目： On the cross-migrativity between uninorms (nullnorms) and overlap (grouping) functions

报告人： 朱宽云 副教授，长江大学

摘　要： Overlap (grouping) functions, uninorms and nullnorms, as sorts of aggregation functions, have been widely applied in decision making, classification, image processing and other related fields. Since its introduction, the α-migrativity as a crucial and particularly interesting feature of bivariate aggregation functions has been researched in many literatures. In our article, firstly, based on the α-cross-migrativity between an overlap function O and a t-norm T, we clarify the \alpha-cross-migrativity between O and a uninorm U when α takes some special values. Afterwards, we confirm that disjunctive uninorms and overlap functions are not α-cross-migrative. Then, we prove that the α-cross-migrativity equation when the uninorm U belongs to

four general classes (U min ,U ide ,U rep ,U cos,min) in detail. In a similar way, the α-cross-migrativity between a grouping function G and a uninorm U is proposed by duality. Finally, we propose the α-cross-migrativity between nullnorms and overlap (grouping) functions.

- **报告 7**

报告题目：Constructions of quasi-overlap functions and their generalized forms on bounded partially ordered sets

报告人：乔军胜 副教授，西北师范大学

摘　要：In this talk, firstly, we generalize the truth values set of quasi-overlap functions from bounded lattices to bounded partially ordered sets and introduce the notions of 0P-quasi-overlap functions, 1P-quasi-overlap functions and 0P,1P-quasi-overlap functions on any bounded partially ordered set P by considering the weaker boundary conditions than the quasi-overlap functions on P. Secondly, we give the constructions of quasi-overlap functions, 0P-quasi-overlap functions, 1P-quasi-overlap functions and 0P,1P-quasi-overlap functions on any partially ordered set P via the so-called Galois s-connections and 0,1-homomorphisms, 1-homomorphisms, 0-homomorphisms and ord-homomorphisms, respectively. In particular, we prove that those constructions contain the methods of extending the known quasi-overlap functions, 0P-quasi-overlap functions, 1P-quasi-overlap functions and 0P,1P-quasi-overlap functions from any partially ordered set P to any other partially ordered sets. Finally, we show that those extensions maintain some basic properties of the known quasi-overlap functions, 0P-quasi-overlap functions, 1P-quasi-overlap functions and 0P,1P-quasi-overlap functions on P, such as, idempotent, Archimedean property and cancellation law.

- **报告 8**

报告题目：模糊差算子及其在图像处理中的应用

报告人：方博闻 博士，武汉理工大学

摘　要：集合的差集运算可以看成是由{0,1}×{0,1}->{0,1}的运算在 Minkowski

算子下生成的。从集合论的角度出发，将其扩展成[0,1]×[0,1]->[0,1]的模糊差算子。从公理化方法和构造性方法两个方面，讨论了其公理化的定义，及其满足集合差集推广性质的结构。通过从膨胀图像元素中除去腐蚀图像元素这一语义解释，将模糊差算子运用在模糊形态学方法中。模糊差算子作为梯度算子，并经过非极大值抑制等图像处理方法，得到图像的边缘。从选用的图像数据集结果上看，边缘检测效果较已有的模糊形态学方法有所改善。

- **报告 9**

报告题目：二型聚合函数基于扩展原理的构造与表示问题

报告人：张炜 博士，西南财经大学

摘　要：在模糊数学领域内，二型模糊集涵盖了传统模糊集、区间值模糊集和犹豫模糊集等，同时它又是特殊的 L-模糊集，近年来更多的学者开始关注与二型模糊集相关的理论和应用。其中，各类二型聚合函数的构造成为热点。针对现有研究仍存在二型聚合函数的构造与表示不完全等问题，我们通过系统刻画广义扩展算子的基本性质，来改进二型聚合函数的构造与表示方法,并得到了一些有趣的结果。这些研究成果对促进二型模糊逻辑的发展和应用具有现实意义。

- **报告 10**

报告题目：On three types of L-fuzzy β-covering-based rough sets

报告人：李薇 硕士生，西北农林科技大学

摘　要：In this paper, we further study L-fuzzy β-covering-based lower and upper rough approximation operators. Following the idea of [14] and [28], we give the definition of L-fuzzy β-covering-based lower and upper rough approximation operators by introducing the concepts such as β-degree of intersection and β-subsethood degree, which are generalizations of degree of intersection and subsethood degree, espectively. After that, starting from three aspects of axiomatic characterizations, matrix representations and interdependency, explore the properties of lower and upper rough approximation operators based on L-fuzzy β-covering.