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A Study of the Concept of Soft Set Theory and Survey of its Literature

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ABSTRACT

Soft set theory was initiated by Molodtsov in 1999 as a mathematical tool for dealing with uncertainties. In recent years, this theory had been developed and applied to many fields. In this paper a comprehensive study of the concept of soft set theory and survey of its existing literature are discussed.

Keywords: *Universe set, parameter set, soft set, approximate value set, Zadeh fuzzy set.*

1. INTRODUCTION

The theory of sets is an indispensable mathematical tool. It describes mathematical models for the class of problems that deal with exactness, precision and certainty. Characteristically, classical set theory is extensional.

More often than not, the real life problems inherently involve uncertainties, imprecision and vagueness. In particular, such classes of problems arise in economics, engineering, environmental sciences, medical sciences, social sciences etc. In course of time, a number of mathematical theories such as probability theory, [12], fuzzy set theory [49], rough set theory [37], interval mathematics theory [19], vague set theory [16], etc., formulated to solve such problems, have been found only partially successful.

For instance, the theory of probability can only deal with stochastically stable systems (or phenomena) where a limit of the sample mean should exist in a long series of trials. Accordingly this can be applied to problems of engineering orientation but not to that of economic or environmental or social.

The method of interval mathematics takes into account, the errors of calculation cases, but it is not sufficiently adaptable for problems with different sorts of uncertainties.

Rough set theory approach can handle problems that involve uncertainties caused by indiscernible elements with different values in decision attributes.

The fuzzy set theory approach is found most appropriate for dealing with uncertainties. However, it is short of providing a mechanism on how to set the membership function, because the nature of the membership function is extremely individualistic.

The major reason for these difficulties arising with the above theories is due to the inadequacies of their parameterization tools [34].

In order to overcome these difficulties,Molodtsov [34] introduced the concept of soft set as a completely new mathematical tool with adequate parameterization for dealing with uncertainties.

During the last few years, studies on soft sets and their applications in various fields have been perceptible. These include Maji et al. [31], who described the application of soft set theory to a decision making problem. Gong et al.[18],Cagman and Enginoglu[8],Kharal and Ahmad[27],Majumdar and Samanta[32], are other significant works on applications of soft sets.

The algebraic structure of soft set theory has been studied increasingly in recent years.Aktas and Cagman [2] gave a definition of soft group, soft subgroup and their basic properties. Acar et al. [1] introduced the notion of soft rings as a parameterized family of subrings. Other researchers who also worked on the algebraic structures of soft sets theory include Jun [21], Jun and Park 22], Fu Li [14], Atagun and Sezgin [5], Ali et al. [4] , among others.

In this paper, we study the concept of soft set theory and review its existing literature.

2. THE CONCEPT OF SOFT SET THEORY

Let $\mathcal{U}$ be an initial universe set and E a set of parameters with respect to $\mathcal{U}$. Let P($\mathcal{U}$) denote the power set of $\mathcal{U}$ and $A \subseteq E$

A pair (F, A) or (F_A, E) is called a soft set over $\mathcal{U}$, where F is a mapping given by F: A ⟶ P($\mathcal{U}$)

In other words, a soft set over a universe $\mathcal{U}$ is a parameterized family of subsets of the universe $\mathcal{U}$. For $e \in A$, F(e) may be considered as the set of e- elements or e- approximate elements of the soft set (F, A). Thus (F, A) = $\{ F(e) \in P(\mathcal{U}): e \in A \subseteq E \}$. As an illustration, let us consider the following;

Suppose a universe $\mathcal{U}$ is the set of six houses under consideration given by

$\mathcal{U}$ = { h_1, h_2, h_3 h_4, h_5, h_6}, the parameter set E={ e_1, e_2, e_3,e_4,e_5} where each parameter e_i, i =1, 2, 3, 4, 5 stands for expensive, beautiful, cheap, modern, wooden respectively, and A= { e_1, e_2, e_3} $\subset E$.

Let a soft set (F, A) describes the attractiveness of the houses which say Mr. X wants to buy.
In this case, to define the soft set (F, A) means to point out the houses for each parameter, i.e., point out expensive houses, beautiful houses, cheap houses, etc.

Now consider the mapping F, where
F: A $\longrightarrow$ P($\mathcal{U}$) is given by

F(e_1)={ h_2, h_4}, F(e_2)= { h_1, h_3 h_5 }, F(e_3)= {h_1, h_3, h_6}.

Then the soft set (F, A) is a parameterized family {F(e_i), i= 1,2,3} of subsets of the universe $\mathcal{U}$ given by

(F, A)= { {h_2, h_4}, {h_1, h_3, h_5}, {h_1, h_3, h_6} }

for example F(e_1) means house (expensive) whose functional value, called the e_1- approximate value set, is the set {h_2, h_4}. Thus we can view the soft set (F, A) as consisting of a collection of approximations given by

(F, A) = {F(e_1)= {h_2, h_4}, F(e_2)= {h_1, h_3, h_5}, F(e_3)= {h_1, h_3, h_6}},

Each approximation has two parts:

(i) A predicate F(e_1), or F(e_2) or F(e_3) and
(ii) The approximate set {h_2, h_4} or {h_1, h_3, h_5} or {h_1, h_3, h_6}, respectively.

The soft set (F, A) can also be represented by the set of ordered pairs given by

(F, A)= {(e_1, F (e_1)), (e_2, F(e_2)), (e_3, F(e_3))} i.e., (F, A)= {(e_1,{h_2, h_4}), (e_2, {h_1, h_3, h_5,}), (e_3,{h_1, h_3, h_6})}.

It is worth noting that the sets F(e), e $\in$ A may be arbitrary , maybe empty or may have non- empty intersection. Also the soft set (F, A) can be divided by F_A In order to store a soft set in a computer, a two-dimensional table is used to represent it. Table 1 (below) shows the tabular representation of the soft set (F, A) where if $h_i \in$ F (e_j), then h_{ij}= 1, otherwise h_{ij}= 0, where h_{ij} are the entries in the table.

Table 1: Tabular Representation of (F, A):

U	**e_1**	**e_2**	**e_3**	**Choice value**
h_1	0	1	1	2
h_2	1	0	0	1
h_3	0	1	1	2
h_4	1	0	0	1
h_5	0	1	0	1
h_6	0	0	1	1

Suppose that Mr. X is interested in buying a house on the basis of his choice parameters expensive, beautiful and cheap. Then, according to the highest choice value, Mr. X can choose h_1 or h_3.

It is interesting to observe that Zadeh's fuzzy set may be considered as a special case of the soft set as follows:

Let U be a universe and let A be a fuzzy set on the universe U, characterized by its membership function

«$_A$, such that «$_A$: $\mathcal{U} \longrightarrow$ [0, 1], A $\subseteq \mathcal{U}$.

Thus the fuzzy set A can be completely defined as a set of ordered pairs given by

$$A = \{(x, «_A(x) : x \in U\}$$
And «$_A(x) \in [0,1]$.

Now let us consider the family of ~ -level sets for «$_A$, given by F (~)= $\{x \in U : «_A(x) \geq \sim\}$, $\sim \in [0,1]$, such that given F, we can find «$_A(x)$ by the formula: «$_A(x) = \sup\{\sim \in [0,1] : x \in F(\sim)\}$.

Then every Zadeh's fuzzy set A maybe considered as the soft set (F, [0, 1]).

As an illustration, let us consider the following example.

Suppose that $\mathcal{U}$ = {h1, h_2, h_3 h_4, h_5, h_6} and that we consider the single parameter quality of houses which are characterized by the value set whose terms are {best, good, fair, and poor}.

Let the terms best and poor for example be associated with its own fuzzy set as follows:

F_{best} = {(h_1, 0.2), (h_2, 0.7), (h_5, 0.9), (h_6, 1.0)}
F_{poor} = {(h_1, 0.9), (h_2, 0.3), (h_3, 1.0), (h_4, 1.0), (h_5, 0.2)}.

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Then, the α – level set of F_{best} and F_{poor} are given by;

$F_{best}(0.2) = \{h_1, h_2, h_5, h_6\}$; $F_{poor}(0.2) = \{h_1, h_2, h_3 h_4, h_5\}$
$F_{best}(0.7) = \{h_2, h_5, h_6\}$; $F_{poor}(0.3) = \{h_1, h_3 h_4\}$
$F_{best}(0.9) = \{h_5, h_6\}$; $F_{poor}(0.9) = \{h_1, h_3 h_4\}$
$F_{best}(1.0) = \{h_6\}$; $F_{poor}(1.0) = \{h_3 h_4\}$

Where here A = {0.2, 0.7, 0.9, 1.0}⊂ [0, 1] which can be regarded as the parameter set such that $F_{best:}$ A⟶ P($\mathcal{U}$) gives the approximate value set F_{best} (∝), for ∝ ∈ A. Thus, the soft set for the fuzzy set F_{best} can be written as;

$(F_{best}, A) = \{(0.2, \{h_1, h_2, h_5, h_6\}), (0.7, \{h_2, h_5, h_6\}), (0.9, \{h_5, h_6\}), (1.0, \{h_6\})\}$.

Similarly the soft set for the fuzzy set F_{poor}, is given by;

$(F_{poor}, B) = \{ (0.2\{ h_1, h_2, h_3 h_4, h_5\}), (0.3\{ h_1, h_3 h_4\}), (0.9\{ h_1, h_3 h_4\}), (1.0\{h_3 h_4\})\}$:

Where B = {0.2, 0.3, 0.9, 1.0}⊂ [0, 1].

In order to have a comparative view of soft set with other existing sets, we briefly define the following: Let $\mathcal{U}$ be an initial universe, E a set of parameters, P($\mathcal{U}$) the power set of $\mathcal{U}$and A ⊆ E.

(i) A classical (or crisp) set C ⊆ $\mathcal{U}$ is a set characterized by the function χ_C, called the characteristic function of C, where χ_C: $\mathcal{U}$ ⟶ {0, 1} and C is defined by

$$C = \{x \in \mathcal{U} : \chi(x) = \begin{cases} 1, if \;\; x \in C \\ 0, if \;\; x \notin C \end{cases}\}$$

(ii) A multi set M ⊆ $\mathcal{U}$ is a set characterized by a numeric– valued function α_M : $\mathcal{U}$⟶{IN ∪ 0} where M is defined by

$$M = \{x \in \mathcal{U} : \alpha_M(x) = \begin{cases} IN, if \;\; x \in M \\ 0, if \;\; x \notin M \end{cases}\}.$$

(iii) A fuzzy set F over $\mathcal{U}$ is a set characterized by a membership function μ_F of F where $\mu_{F\,:}$ $\mathcal{U}$⟶ [0, 1] and F is represented by;

$F = \{(x, \mu_F(x)): x \in \mathcal{U}, \mu_F(x) \in [0, 1]\}$.

(iv) Let R be an equivalence relation on $\mathcal{U}$, and for x ∈ $\mathcal{U}$, let $[x]_R$ denote the equivalence class of R determined by x. Let X ⊆ $\mathcal{U}$, X is characterized with respect to R by a pair of crisp sets called;

(a) The lower approximation of X, denoted by $R_* X$ and defined as;

$R_* X = \{x \in \mathcal{U} : [x]_R \subseteq X\}$ which consist of the set of all objects that certainly belong to X.

(b) The upper approximation of X denoted by R*X defined as;

$R^*X = \{x \in \mathcal{U}: [x]_R \cap X \neq \boldsymbol{\phi}\}$ consisting of the set of all objects which possibly belong to
X. Then the set X is called a rough set if;
$R^*X - R_*X \neq \boldsymbol{\phi}$ and X is crisp if $R^*X - R_*X = \boldsymbol{\phi}$.

(v) A vague set V is a set characterized by two membership functions viz, a true membership function t_v: $\mathcal{U}$⟶ [0, 1] and a false membership function f_v: $\mathcal{U}$⟶ [0, 1], with

$0 \leq t_v(x)+f_v(x) \leq 1$ and V is represented as;
$V = \{(x, [t_v(x), f_v(x)]: x \in \mathcal{U}\}$, where the interval $[t_v(x), 1-f_v(x)]$ is called the vague value of x in V.

(vi) A soft set (F, A), F_A or (f_A, E) over $\mathcal{U}$ is characterized by an approximate set valued function; f_A: E⟶ P ($\mathcal{U}$) and (F, A) is represented as a set of ordered pairs defined as;

$(F, A) = \{(x, f_A(x): f_A(x) \in P(\mathcal{U})$ and $f_A(x) = \boldsymbol{\phi}$, if $x \notin A\}$.

3. LITERATURE REVIEW OF SOFT SET THEORY

Molodtsov [34] initiated the concept of soft set theory as a general mathematical tool for solving complicated problems dealing with vagueness and uncertainties which classical methods and some modern mathematical methods, such as probability theory [12], fuzzy set theory [49], rough set theory [37], interval mathematics theory[19], vague set theory [16] etc., cannot successfully solve due to inadequacy of their parameterization tools.

Molodtsov [34] pointed out that soft set theory provides enough parameter and as a result accommodates initial approximate descriptions of an object. This, he said, makes soft set theory free from the above difficulty and becomes very convenient and easily applicable in practice. Molodtsov[34] therefore defines a soft set as a parameterized family of subsets of a universe set, where each element is considered as the set of approximate elements of the soft set. He also successfully applied soft set theory in areas such as smoothness of function (where he compared smoothness of function as being similar to continuity of functions in the classical case), game theory, operation research, Riemann and Perron integrations, probability theory and measurement theory, and introduced the basic notions of the theory of soft sets.

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Based on the work of Molodtsov [34],Maji et al.,[30] initiated the theoretical study of the soft set theory. This includes, the definition of soft subset, soft superset, equality of soft sets, and complement of a soft set among others, with some illustrative examples. Soft binary operations such as AND OR operations, union and intersection operations are also defined. They verified De Morgan's law and presented a number of results on soft set theory. For the purpose of storing a soft set in a computer, they represented a soft set in the form of a table.

Yang [48] was the first to point out error in the work of Maji et al., [30] by giving a counter example. Ali et al.,[3] also pointed out several assertions in Maji et al. ,[30]that are not true in general by counter examples Some new operations such as restricted union, restricted intersection, restricted difference and extended intersection were further introduced. Moreover they improved on the notion of complement of a soft set and proved that certain De Morgan's laws hold in soft set theory with respect to these new operations. They also remarked that the incorrectness of the assertions mentioned above may be as a result of the way and manner some of the related notions were defined.

Ge and Yang [17], further investigated the operational rules given by Maji et al. [30] and Ali et al., [3] and obtained some necessary and sufficient conditions for the rules to hold. They specifically noted that several assertions in relation to null soft set and absolute soft set are incorrect, due to the notation of the related definitions in Maji et al. ,[30].

Fu Li [15] also pointed out some errors in [30] and corrected them. He also discussed the distributive laws with respect to certain operations of union and intersection introduced in [3], using De Morgan laws.

Sezgin and Atagun [40], proved that certain De Morgan's laws with respect to different operations on soft set defined by (Maji et al. ,[30], (Pei and Miao [38] and Ali et al. ,[3] hold. They further discussed various basic properties of operations on soft set such as union, restricted union, extended and restricted intersections, restricted difference and their interconnection between them. Finally they defined the notion of restricted symmetric difference of soft sets and investigated its properties with examples.

Singh and Onyeozili [42, 43, 44] established and investigated (with illustrative examples) some results on distributive and absorption properties with respect to various operations on soft sets.

Gong et al. [18], proposed the concept of injective soft set and some of its operations such as the restricted AND the relaxed AND operations. They also defined the dependency between two injective soft sets and the injective soft decision system and gave an application of injective soft set in decision making problem.

Xiao et al. [46], reviewed the notions of soft sets and injective soft sets and proposed the notion of exclusive disjunctive soft sets. Some studies on operations of exclusive disjunctive soft sets such as restricted/ relaxed AND- operations and the dependency between exclusive disjunctive soft sets and injective soft sets were also established. They finally gave an application of exclusive disjunctive soft set to attribute reduction of incomplete information system and pointed out that potential studies could be focusing on how to extend it to fuzzy soft set as well as applying it in solving decision- making problems.

Babitha and Sunil [6] introduced the concept of soft set relation as a sub soft set of the Cartesian product of soft sets. Besides, many related concepts such as equivalence soft set relation, partition of soft set, soft set function, composition of soft set functions with related results were proposed. In their concluding remarks, they proposed a future research on the theoretical aspect of these generalized concepts in relation to topology generated by soft set relation.

In continuation of their work, Babitha et al. ,[7], introduced the concept of anti- symmetric relation and transitive closure of a soft set relation and proposed an analogue of Warshall's algorithm for calculating the transitive closure of a soft set relation. They also defined ordering on a soft set and established the relationship between different orderings supported with examples.

In an attempt to broaden the theoretical aspect of soft set relation, Yang et al. [47], introduced the notions of anti- reflexive kernel, symmetric kernel, reflexive closure and symmetric closure of a soft set relation and obtained with proofs some results involving them. The notions of soft set relation mapping and its inverse were also proposed and some of their related properties discussed.

Qin and Hong [39] made a theoretical study of the algebraic structures of soft sets such as lattice structures and introduced the concept of soft equality relation and also discussed its related properties. It was proved that soft equality relation is a congruence relation with respect to some operations. They finally established the quotient algebra with respect to restricted union ($\cup_R$) and extended intersection ($\cap_E$).

Won Keon Min [33] introduced and studied the concept of similarity between soft sets which is an extension of the equality for soft sets and investigated some properties. He also introduced the concept of conjunctive ($\propto\wedge\beta$) and disjunctive ($\propto \vee \beta$) of ordered pair parameter ($\propto$, β) for soft set theory; modified and investigated some operations of soft set theory introduced by (Maji et al. ,2003).

Kharal and Ahmad [27] introduced the notion of mapping on soft classes and study several properties of images and inverse images of soft sets supported with examples and counter examples. An application of these notions to the problem of medical diagnosis in medical expect systems where a patient's complaints or symptoms may easily be encoded into a soft set, was finally given.

In line with the work of Kharal and Ahmad [27], Majumdar and Samanta [32] introduced the idea of soft mapping and studied some of its properties with the observation that fuzzy mapping is a special case of soft mapping. Majumdar et al. [32] also defined the image and the respective inverse image of a soft set under a soft mapping and studied some of their properties. They also applied the soft mapping in medical diagnosis problem and remarked that the model used in the diagnosis was very preliminary and may be improved by incorporating detailed disease- symptom information and clinical results. For future research, a work on the theory of fuzzy soft mapping and the intuitionist fuzzy soft mapping was also proposed.

Chen et al..[11] pointed out that the result of soft set reductions proposed by(Maji et al. ,[31] was incorrect and explained with example that the algorithms used to first compute the redact -soft set and then the choice value for selecting the optimal objects in the decision problem were unreasonable. As a result, they proposed a new definition of parameter reduction for the improvement of Maji et al. ,[31] and concluded that the idea of redact under rough set theory generally cannot be applied directly in redact under soft set theory, with the observation that the parameter reduction may well play an important role in some knowledge discovery problems.

Kong et al.,[28] analyzed that the problems of sub- optimal choice was not addressed by Chen et al. ,[11] and so introduced the definition of normal parameter reduction in soft set theory to overcome the problems in Chen's model. Two new definitions viz,-the parameter important degree and the soft decision partition were described and use to analyze the algorithm of normal parameter reduction. They noted that with this approach, the optimal choices are still preserved.

Zou and Xiao[50], proposed a new technique for decision making of soft set theory under incomplete information systems which is based on the calculation of weighted –average of all possible choice values of object.

Herewan et al.[20] also analyzed the existing works on attributes and parameterization reduction of soft sets proposed by Maji et al. ,[31], Zou et al. ,[50] and remarked that all the techniques were based on Boolean- valued information system. They proposed an alternative approach for attribute reduction which was based on the notion of multi-soft sets, constructed from a multi-valued information system and obtained a result which turned out to be equivalent to Pawlak's rough set reduction.

Pei and Miao[38] and Xiao et al.[46] discussed the relationship between soft sets and information systems and showed that soft sets are a class of special information systems.

Various applications of soft set theory were made by several authors. Maji et al. ,[31], gave a practical application of soft sets in decision making problem using the notion of knowledge reduction in rough set theory of Pawlak [37].

Later, Cagman and Enginolu [8] redefined some operations of soft set theory in order to make them more functional for improving several new results. Four products of soft sets viz-AND ($\wedge$) - product, OR ($\vee$)- product AND-Not ($\bar{\wedge}$)- product and OR-NOT ($\underline{\vee}$)- product were also defined and their properties discussed. Using AND ($\wedge$)-product, they constructed an uni-int (union- intersection) soft decision making method which select a set of optimum elements from the alternatives without using the rough sets and fuzzy soft sets. They finally applied the method to a decision making problem, remarking that apart from the uni-int soft decision method, similar types of decision methods using int-uni (intersection-union), uni-uni (union-union) and int-int (intersection-intersection can be constructed for $\vee$-product, $\bar{\wedge}$-product and $\underline{\vee}$-product respectively in a similar way though with some modifications.

Similar to their work in Cagman and Enginoglu,[9], they introduced soft matrices which are representation of soft sets and defined AND ($\wedge$), OR ($\vee$), AND-NOT ($\bar{\wedge}$) and OR-NOT ($\underline{\vee}$) products of soft matrices. Also using the AND-product of soft matrices, they constructed a soft max-min (maximum-minimum) decision making method and applied it to a real estate problem, noting that similarly, other products $\vee$, $\bar{\wedge}$ and $\underline{\vee}$ of soft matrices could be used for other convenient or similar problems.

Other works on applications of soft set theory include(Chen et al. ,[11]), (Gong et al. ,[18]), (Kharal et al. ,[27]), (Majundar et al. ,[32]), among others.

The algebraic structures of soft set theory have also been studied extensively. Aktas and Cagman [2], introduced the basic concepts of soft groups, soft subgroups, normal soft subgroups and soft homomorphism and discussed their basic properties.

Feng et al. [13] considered the algebraic structure of smearing and introduced the notion of soft smearing. They studied and investigated some basic algebraic properties of soft smearing and some related notions such as soft ideals, idealistic soft semirings and soft smearing homomorphism with illustrative examples

Based on the work of Feng et al. [13]), Acar et al. [1] introduced the basic notions of soft rings as a parameterized family of subrings of a ring over a ring with some illustrative examples. They also introduced the notions of soft subrings, soft ideal of a soft ring, idealistic soft rings and soft ring homomorphism with some corresponding examples.

In relation to the work of Acar et al. [1], Celik et al.,[10] introduced some new operations on soft ring such as extended sum, restricted sum, extended product, restricted product and established some of their basic properties.

Ali et al.,[4]defined some algebraic structures such as semi groups, semirings and lattices associated with soft sets, and completely described the distributive and absorption laws on operations of soft. MV- algebras and BCK-algebras associated with soft set, with a fixed set of parameters were also studied.

Atagun and Sezgin[5], introduced and studied some sub structures such as soft subrings and soft ideals of a ring, soft subfield of a field and soft sub module of a module with several illustrative examples. Some related properties on operations of restricted intersection, product and sum for these soft sub- structures were established and investigated with examples.

In another work of Sezgin and Atagun [40], they first corrected some assertions in (Soft set and soft group by (Aktas and Cagman, [2]) and further extended the theoretical aspects of soft group defined in (Aktas and Cagman,[2]) by introducing the concept of normalistic soft group, normalistic soft group homomorphism, and establishing that the normalistic soft group isomorphism is an equivalence relation on normalistic soft groups.

Fu Li [14] defined the notion of soft lattice, and the operations on soft lattice with several examples. (Nagaranjan and Meenambigar,2011)further defined soft lattices, soft distributive lattices, soft modular lattices, soft lattice ideals and soft lattice homomorphism and investigated several related properties and some characterization theorems, while Karaaslan et al. ,[26] also defined soft lattices and their substructures different from the above authors (Fu Li ,[14] and Nagaranjan et al. ,[35]).

Jun[21] applied the notion of soft sets to the theory of BCK/BCI- algebras and introduced the notion of soft BCK/ BCI- algebras and soft sub algebras and then derived their basic properties with some illustrative examples.

Lee et al.[29] and Jun et al.[23] introduced the notions of implicative, positive implicative and commutative soft ideals. They also introduced the notion of idealistic soft BCK- algebra with some illustrative examples and derived their basic properties.

Jun et al.[24] introduced the concept of soft Hilbert algebra, soft Hilbert abysmal algebra and soft Hilbert deductive algebra and investigated their properties. Jun et al. ,[24] also in another paper, introduced the notion of soft p- ideals and p- idealistic soft BCI- algebras and discussed their basic properties.
Some other authors who have studied on the algebraic structures of soft set theory include (Jun and Park [22]), (Sun et al.[45]), (Qin and Hong,[39]), (Ozturk et al. ,[36], among others.

4. CONCLUSION AND FUTURE WORK

Soft set theory, introduced by Molodtsov in 1999 is an effective tool with adequate parameterization in dealing with problems of uncertainties. Recently, various researches had been done on this theory both in theory and in practice. In this paper, a study of the concept of soft set theory and review of its existing literature is carried out. To extend this work, one could generalize it to fuzzy soft set theory, multi set theory and soft multi set theory.

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