Some results on soft pre continuity

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Abstract

Continuous functions play a vital role in the study of topology as they are the main linking factor of different spaces and objects. It may not be possible to have stronger form of continuous functions in all the occasions. The weaker forms are needed. This paper aims at introducing soft pre continuity and deriving some properties of soft pre continuous functions.

\textit{Keywords:} Soft topology, soft continuous mapping, soft pre open sets, soft pre continuous, soft product space, soft diagonal.

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1 Definitions

\textbf{Definition 1.1.} \cite{15}: A pair \((F, A)\) in \(X\) is a parameterized family of subsets of the universe \(X\). For \(\epsilon \in A\), \(F(\epsilon)\) may be considered as the set of \(\epsilon\)-approximate elements of the soft set \((F, A)\). Clearly a soft set is not a set in ordinary sense.

\textbf{Definition 1.2.} \cite{1}: For two soft sets \((F, A)\) and \((G, B)\) over \(X\), \((F, A)\) is a soft subset of \((G, B)\), if \(A \subseteq B\) and for \(\forall \epsilon \in A\), \(F(\epsilon) \subseteq G(\epsilon)\) and is written as \((F, A) \overset{\epsilon}{\subseteq} (G, B)\). \((F, A)\) is said to be a soft super set of \((G, B)\), if \((G, B)\) is a soft subset of \((F, A)\) and is denoted by \((F, A) \overset{\epsilon}{\supseteq} (G, B)\).

\textbf{Definition 1.3.} \cite{1}: Union of two soft sets \((F, A)\) and \((G, B)\) over the common universe \(X\) is the soft set \((H, A)\).
\( C \), where \( C = A \cup B \), and \( \forall \epsilon \in C \),

\[
H(\epsilon) = \begin{cases} 
F(\epsilon) & \text{if } \epsilon \in A - B \\
G(\epsilon) & \text{if } \epsilon \in B - A \\
F(\epsilon) \cup G(\epsilon) & \text{if } \epsilon \in A \cup B 
\end{cases}
\]

written as \((F,A) \cup (G,B) = (H,C)\)

**Definition 1.4.** [1]: Let \((F, A)\) and \((G, B)\) be two soft sets over \(X\) with \(A \cap B \neq \emptyset\). Intersection of two soft sets \((F, A)\) and \((G, B)\) is a soft set \((H, C)\), where \(C = A \cap B\), and \(\forall \epsilon \in C\), \(H(\epsilon) = F(\epsilon) \cap G(\epsilon)\) and is written as \((F, A) \cap (G, B) = (H, C)\).

**Definition 1.5.** [1]: Let \(X\) be a universe and \(E\) a set of attributes. Then the collection of all soft sets over \(X\) with attributes from \(E\) is called a soft class and is denoted as \(\tilde{SS}(X, E)\) or \(\tilde{SS}(\tilde{X})\).

**Definition 1.6.** [1] Let \(\tilde{SS}(X, E)\) and \(\tilde{SS}(Y, E')\) be two soft classes. Let \(u : X \rightarrow Y\) and \(p : E \rightarrow E'\) be mappings. Then a mapping \(\tilde{f}_{pu} : (X, E) \rightarrow (Y, E')\) is defined as; for a soft set \((F, A)\) in \((X, E)\) and \(B = p(A) \subseteq E'\), \((\tilde{f}_{pu}(F, A), B)\) is a soft set in \((Y, E')\) given by

\[
\tilde{f}_{pu}(F, A)(\beta) = \begin{cases} 
u\left(\bigcup_{\alpha \in p^{-1}(\beta) \cap A} F(\alpha)\right) & \text{if } p^{-1}(\beta) \cap A \neq \emptyset \\
0 & \text{otherwise} \end{cases}
\]

for \(\beta \in B \subseteq E'\). \((\tilde{f}_{pu}(F, A), B)\) is called a soft image of a soft set \((F, A)\). If \(B = E'\), then \((\tilde{f}_{pu}(F, A), E')\) is written as \(\tilde{f}_{pu}(F, A)\).

**Definition 1.7.** [1]: Let \(\tilde{f}_{pu} : (X, E) \rightarrow (Y, E')\) be a mapping from a soft class \((X, E)\) to another soft class \((Y, E')\) and \((G, C)\) a soft set in the soft class \((Y, E')\), where \(C \subseteq E'\). Let \(u : X \rightarrow Y\) and \(p : E \rightarrow E'\) be mappings. Then \((\tilde{f}_{pu}^{-1}(G, C), D)\), \(D = p^{-1}(C)\), is a soft set in the soft class \((X, E)\), defined as:

\[
\tilde{f}_{pu}^{-1}(G, C)(\alpha) = \begin{cases} \nu^{-1}(G(p(\alpha))), & P(\alpha) \in C \\
\Phi, & \text{otherwise} \end{cases}
\]

for \(\alpha \in D \subseteq E\). \((\tilde{f}_{pu}^{-1}(G, D), D)\) is called soft universe image of \((G, C)\). \((\tilde{f}_{pu}^{-1}(G, C), E)\) shall be written as \((\tilde{f}_{pu}^{-1}(G, C))\).

**Definition 1.8.** [1]: Let \(\tilde{f}_{pu} : (X, E) \rightarrow (Y, E')\) be a mapping and \((F, A)\), \((G, B)\) soft sets in \((X, E)\). Then for \(\beta \in E'\), soft union and intersection of soft images of \((F, A)\) and \((G, B)\) are defined as:

\[
(\tilde{f}_{pu}(F, A) \cup \tilde{f}_{pu}(G, B))\beta = \tilde{f}_{pu}(F, A)\beta \cup \tilde{f}_{pu}(G, B)\beta,
\]

\[
(\tilde{f}_{pu}(F, A) \cap \tilde{f}_{pu}(G, B))\beta = \tilde{f}_{pu}(F, A)\beta \cap \tilde{f}_{pu}(G, B)\beta
\]
Definition 1.19. [1]: Let \( \tilde{f}_{pu} : (X, E) \to (Y, E') \) be a mapping and \((F, A), (G, B)\) soft sets in \((Y, E')\). Then for \( \alpha \in E \), soft union and intersection of soft inverse images of soft sets \((F, A)\) and \((G, B)\) are defined as:

\[
\tilde{f}_{pu}^{-1}(F, A) \cup \tilde{f}_{pu}^{-1}(G, B) = \tilde{f}_{pu}^{-1}(F, A) \cup \tilde{f}_{pu}^{-1}(G, B) \\
\tilde{f}_{pu}^{-1}(F, A) \cap \tilde{f}_{pu}^{-1}(G, B) = \tilde{f}_{pu}^{-1}(F, A) \cap \tilde{f}_{pu}^{-1}(G, B)
\]

Definition 1.10. [5]: Let \( \tau \) be the collection of soft sets over \( X \). A soft set \((F, E)\) over \( X \), then \( \tau \) is said to be a soft topology on \( x \) if (1) \( \phi, \overline{X} \) belong to \( \tau \) (2) The union of any number of soft sets in \( \tau \) belongs to \( \tau \), (3) The intersection of any two soft sets in \( \tau \) belongs to \( \tau \). The triplet \((X, \tau, E)\) is called a soft topological space over \( X \).

Definition 1.11. [5]: Let \((X, \tau, E)\) be a soft topological space over \( X \). A soft set \((F, E)\) over \( X \) is said to be a soft closed in \( X \), if its relative complement \((F, E)'\) belongs to \( \tau \).

Definition 1.12. [5]: Let \((X, \tau, E)\) be a soft topological space over \( X \). Then the collection \( \tau_{\alpha} = \{F(\alpha) | (F, E) \in \tau \} \) for each \( \alpha \in E \), defines a topology on \( X \) (and is the topology generated by \( \alpha \)).

Definition 1.13. [5]: Let \((X, \tau, E)\) be a soft topological space over \( X \) and \((F, E)\) be a soft set over \( X \). Then the soft closure of \((F, E)\), denoted by \( \overline{(F, E)} \) or \( \overline{Cl}(F,E) \) is the intersection of all soft closed super sets of \((F, E)\).

Definition 1.14. [5]: Let \((F, E)\) be a soft set over \( X \). The soft set \((F, E)\) is called a soft point, denoted by \( x_e \) if for the element \( e \in E \), \( F(e) = \{x\} \) and \( F(e') = \Phi \) for all \( e' \in E - \{e\} \).

Definition 1.15. [5]: \( x_e \) is said to be a soft interior point of \((G, E)\), if there exists a soft open set \((F, E)\) such that \( x_e \in (F, E) \subset (G, E) \).

Definition 1.16. [5]: Let \((X, \tau, E)\) be a soft topological space over \( X \), \((G, E)\) be a soft set over \( X \) and \( x_e \in X \). Then \((G, E)\) is said to be a soft neighbourhood of \( x \), if there exist a soft open set \((F, E)\) such that \( x_e \in (F, E) \subset (G, E) \).

Definition 1.17. [5]: Let \((X, \tau, E)\) be a soft topological space over \( X \) then soft interior of soft set \((F, E)\) over \( X \) is denoted by \((F, E)^{\circ}\) or \( sint(F, E) \) and is defined as the union of all soft open sets contained in \((F, E)\).

Definition 1.18. [5]: Let \((X, \tau, E)\) and \((Y, \tau', E)\) be two soft topological spaces, \( \tilde{f}_{pu} : (X, \tau, E) \to (Y, \tau', E) \) be a mapping. For each soft neighbourhood \((H, E)\) of \( \tilde{f}_{pu}(x_e) \) if there exists a soft neighbourhood \((F, E)\) of \( x_e \) such that \( \tilde{f}_{pu}(F, E) \subset (H, E) \), then \( \tilde{f}_{pu} \) is said to be soft continuous mapping at \( x_e \). If \( \tilde{f}_{pu} \) is soft continuous mapping for all \( x_e \) then \( \tilde{f}_{pu} \) is called soft continuous mapping.

Definition 1.19. [5]: Let \((X, \tau, E)\) and \((Y, \tau', E)\) be two soft topological spaces, \( \tilde{f}_{pu} : X \to Y \) be a mapping.

a) If the image \( \tilde{f}_{pu}(F, E) \) of each soft open set \((F, E)\) over \( X \) is a soft open set in \( Y \), then \( \tilde{f}_{pu} \) is said to be a soft open mapping.
b) If the image \( \tilde{f}_{pu}(H, E) \) of each soft closed set \((H, E)\) over \(X\) is a soft closed set in \(Y\), then \( \tilde{f}_{pu} \) is said to be a soft closed mapping.

2 Soft pre continuous

**Definition 2.1.** In a soft topological space \((U, \tau, A)\), a soft set \((G,A)\) is said to be soft preopen if \((G,A) \subseteq \tilde{s} \text{ int}(\tilde{s} \text{ cl}(G,A))\) and \((F,A)\) is said to be soft preclosed if \((F,A) \supseteq \tilde{s} \text{ cl}(\tilde{s} \text{ int}(F,A))\)

**Definition 2.2.** Let \((X, \tau, A)\) and \((Y, \tau', B)\) be soft topological spaces. Let \(u: X \rightarrow Y\) and \(p:A \rightarrow B\) be a mappings. Let \(\tilde{f}_{pu} : \tilde{S}S(X, A) \rightarrow \tilde{S}S(Y, B)\) be a function. Then the function \(\tilde{f}_{pu}\) is called a soft pre continuous function if \(\tilde{f}_{pu}^{-1}(G, B) \subseteq \tilde{S}PO(X), \forall(G, B) \in \tilde{S}O(Y)\).

**Theorem 2.1.** Let \((X, \tau, A)\) and \((Y, \tau', B)\) be soft topological spaces. Let \(u: X \rightarrow Y\) and \(p:A \rightarrow B\) be a mappings. Let \(\tilde{f}_{pu} : \tilde{S}S(X, A) \rightarrow \tilde{S}S(Y, B)\) be a function. Then for the classes, soft pre-continuous functions the following are equivalent

1. \(\tilde{f}_{pu}\) is soft pre continuous function,

2. \(\tilde{f}_{pu}^{-1}(F, B) \subseteq \tilde{S}PC(X), \forall(F, B) \in \tilde{S}C(Y)\)

**Proof.**

(1) \(\Rightarrow\) (2) \(\tilde{f}_{pu}^{-1}(F, B) \subseteq \tilde{S}PC(X), \forall(F, B) \in \tilde{S}C(Y)\)

**Theorem 2.2.** Let \((X, \tau, A)\) and \((Y, \tau', B)\) be soft topological spaces and \(\tilde{f}_{pu} : \tilde{S}S(X, A) \rightarrow \tilde{S}S(Y, B)\) be a function. Then every soft continuous function is soft-pre continuous function.

**Proof.** Under a soft continuous function, inverse image of soft open set is soft open but every soft open is soft preopen.

**Lemma 2.1.** If \((F, A)\) \(\in \tilde{S} PO(X)\) and \((G, A)\) \(\in \tilde{S}O(X)\), then \((F, A) \cap (G, A) \in \tilde{S}PO(\tilde{S}O(X))\).

**Proof.** \((F, A) \cap (G, A) \subseteq (G, A) \cap \tilde{s} \text{ int}(\tilde{s} \text{ cl}(F, A)) = \tilde{s} \text{ int}(G, A) \cap \tilde{s} \text{ int}(\tilde{s} \text{ cl}(F, A)) \subseteq \tilde{s} \text{ int}(G, A) \cap \tilde{s} \text{ cl}(F, A)) \subseteq \tilde{s} \text{ int}(G, A) \cap \tilde{s} \text{ cl}(F, A) \subseteq \tilde{s} \text{ int}(G, A) \cap \tilde{s} \text{ cl}(F, A)\).

**Theorem 2.3.** If \(\tilde{f}_{pu} : X_A \rightarrow Y_A\) is s.p.c and \((F, A)\) \(\in \tilde{S}SO(\tilde{Y})\), then the restriction \(\tilde{f}_{pu}(F, A) : (F, A) \rightarrow \tilde{Y}\) is s.p.c.

**Proof.** Let \((G, B) \subseteq \tilde{Y}\) be soft open set. Therefore \(\tilde{f}_{pu}^{-1}(G, B) \in \tilde{S}PO(\tilde{Y})\). Since, \((F, A) \in \tilde{S}SO(\tilde{Y})\). By Lemma 2.1, \(\tilde{f}_{pu}^{-1}(G, B \cap (F, A)) = [\tilde{f}_{pu}(F, A) \cap (G, B)] \in \tilde{S}PO((F, A))\). Therefore, \(\tilde{f}_{pu}(F, A)\) is s.p.c.

**Lemma 2.2.** If \((F, A)\) \(\in \tilde{S}PO(\tilde{X})\) and \((G, A)\) \(\in \tilde{S}PO(F, A)\), then \((G, A)\) \(\in \tilde{S}PO(\tilde{X})\).
Proof. Since \((G, A) \subseteq \bar{s} \, \text{int}(F, A)\) (\(\bar{s} \, \text{cl}(F, A)\) \((G, A)\)) and \(\bar{s} \, \text{int}(F, A)\) (\(\bar{s} \, \text{cl}(F, A)\) \((G, A)\)) is open in \(E'(F, A)\), there exist an soft open set \((H, A) \subseteq X\) s.t.\((F, A) \cap (H, A) = \bar{s} \, \text{int}(F, A)\) (\(\bar{s} \, \text{cl}(F, A)\) \((G, A)\)). 

\((G, A) \subseteq \bar{s} \, \text{int} \, \bar{s} \, \text{cl}(F, A) \cap (H, A) \subseteq \bar{s} \, \text{int} \, \bar{s} \, \text{cl}(F, A) \cap (H, A) = \bar{s} \, \text{int} \, \bar{s} \, \text{cl}(F, A) \cap (G, A)) \subseteq \bar{s} \, \text{int} \, \bar{s} \, \text{cl}(F, A) \cap (G, A)). \) Then \((G, A) \in \bar{s} \, \text{PO}(\bar{X})\) \(\Box\)

**Theorem 2.4.** Let \(\tilde{f}_{pu} : \tilde{X} \rightarrow \tilde{Y}\) be a mapping and \(\{(F_i,A) : i \in I\}\) a cover of \(\tilde{X}\) such that \((F_i, A) \in \tilde{S} \, \text{PO}(\tilde{X})\) for each \(i \in I\). Then, \(\tilde{f}_{pu}\) is s.p.c if \(\tilde{f}_{pu}(F_i, A)\) is s.p.c for each \(i \in I\).

Proof. Let \((G, A) \subseteq \tilde{Y}\) be soft open set, so \((\tilde{f}_{pu}(F_i, A))^{-1}(G, A) = \tilde{f}_{pu}(F_i, A) \in \tilde{S} \, \text{PO}(F_i, A)\). Since \((F_i, A) \in \tilde{S} \, \text{PO}(\tilde{X})\), by lemma-2.2 \((\tilde{f}_{pu}(F_i, A))^{-1}(G, A) \in \tilde{S} \, \text{PO}(\tilde{X})\) for each \(i \in I\), but \(\tilde{f}_{pu}(F_i, A) = \bigcup_{i \in I} (\tilde{f}_{pu}(F_i, A))^{-1}(G, A)\). Then, \(\tilde{f}_{pu}(F_i, A) \in \tilde{S} \, \text{PO}(\tilde{X})\). Therefore, \(\tilde{f}_{pu}\) is s.p.c. \(\Box\)

**Theorem 2.5.** If \(\tilde{f}_{pu} : \tilde{X} \rightarrow \tilde{Y}\) is s.p.c. and \(\tilde{Y}\) is a hausdorff space, then the graph \(G(\tilde{f}_{pu}) = \{(x, \tilde{f}_{pu}(x)) : x \in \tilde{X}\}\) of \(\tilde{f}_{pu}\) if soft preclosed.

Proof. Let \((x, y) \notin G(\tilde{f}_{pu})\), so \(y \neq \tilde{f}_{pu}(x)\). Since \(\tilde{Y}\) is Hausdorff space, there exist two disjoint open sets \((G, A)\) and \((H, A)\) such that \(\tilde{f}_{pu}(x) \in (H, A)\) and \(y \in (G, A)\). Since \(\tilde{f}_{pu}\) is s.p.c., there exists \((F, A) \in \tilde{S} \, \text{PO}(\tilde{X})\) such that \(x \in (F, A)\) and \(\tilde{f}_{pu}(F, A) \subseteq (H, A)\). Therefore, \((x, y) \subseteq (F, A) \times (G, A) \subseteq \tilde{X} \times \tilde{Y} - G(\tilde{f}_{pu})\). Since, \((G, A)\) is soft open, \((F, A) \times (G, A) \in \tilde{S} \, \text{PO}(\tilde{X})\times \tilde{Y}\) and \(\tilde{X} \times \tilde{Y} - G(\tilde{f}_{pu})\) is soft-pre open. Then \(G(\tilde{f}_{pu})\) is soft-pre closed in \(\tilde{X} \times \tilde{Y}\). \(\Box\)

**Theorem 2.6.** If \(\tilde{f}_{pu} : \tilde{X} \rightarrow \tilde{Y}\) is soft pre continuous and \(\tilde{Y}\) is Hausdorff’s space, then the set \(\{(F_1, A), (F_2, A)) : \tilde{f}_{pu}(F_1, A) = \tilde{f}_{pu}(F_2, A)\}\) \(\tilde{S} \, \text{PC}\) in the produce space \(\tilde{X} \times \tilde{X}\).

Proof. Let \(\tilde{\Delta}\) be the diagonal of \(\tilde{Y} \times \tilde{Y}\). Since \(\tilde{Y}\) is Hausdorff space, \(\tilde{\Delta}\) is a soft closed set of \(\tilde{Y} \times \tilde{Y}\)[4]. Since \(\tilde{f}_{pu}\) is s.p.c., \(\tilde{f}_{pu} \times \tilde{f}_{pu} : \tilde{X} \times \tilde{X} \rightarrow \tilde{Y} \times \tilde{Y}\) is s.p.c. Therfore, \((\tilde{f}_{pu} \times \tilde{f}_{pu})^{-1}(\tilde{\Delta})\) is soft pre closed. But \((\tilde{f}_{pu} \times \tilde{f}_{pu})^{-1}(\tilde{\Delta}) = \{(F_1, A), (F_2, A)) : \tilde{f}_{pu}(F_1, A) = \tilde{f}_{pu}(F_2, A)\}\). \(\Box\)

**Lemma 2.3.** A set \((F, A) \subseteq \tilde{X}\) is soft pre-closed if and only if \(\bar{s} \, \text{pcl}(F, A) = (F, A)\)

**Definition 2.3.** Let \((F, A) \subseteq \tilde{X}\) be a set. A map \(\tilde{f}_{pu} : \tilde{X} \rightarrow (F, A)\) is called soft pre-continuous retraction. If \(\tilde{f}_{pu}(F, A) = \text{identity}\).

**Theorem 2.7.** Let \((F, A) \subseteq \tilde{X}\) be a soft set and \(\tilde{f}_{pu} : \tilde{X} \rightarrow (F, A)\) be s.p.c. retraction mapping. If \(\tilde{X}\) is a Hausdorff space, then \((F, A)\) is a soft pre closed set of \(\tilde{X}\).

Proof. Suppose that \((F, A)\) is not soft pre closed. Then by lemma-2.3, there exist a point \(x_e \in \tilde{X}\) such that, \(x_e \in \bar{s} \, \text{cl}((F, A))\), but \(x_e \notin (F, A)\). So \(\tilde{f}_{pu}(x_e) \notin x_e\). Since \(\tilde{X}\) is a Hausdorff space, there exist disjoint soft open sets \((G_1, A)\) and \((G_2, A)\) in \(\tilde{X}\) s.t., \(x_e \in (G_1, A)\) and \(\tilde{f}_{pu}(x_e) \in (G_2, A)\). Let \((H, A)\) be an arbitrary soft pre-open sets containing \(x_e\). Then, \(x_e \in (H, A) \cap (G_1, A) \in \tilde{S} \, \text{PO}(\tilde{X})\). Since \(x_e \in \bar{s} \, \text{pcl}(F, A), ([H, A] \cap (G_1, A)] \cap (F, A) \neq \emptyset\). So, there exist a point \(y_e \in \tilde{X}\) such that \(\tilde{f}_{pu}(x_e) \neq y_e\). Since \(y_e\)
\[ \tilde{e} (F, A), \tilde{f}_{pu}(y_e) = y_e \text{ and hence } \tilde{f}_{pu}(y_e) \tilde{e} (G_2, A). \] Therefore, \( \tilde{f}_{pu}((H, A)) \tilde{\subseteq} (G_2, A) \), which contradicts the s.p.c., of \( \tilde{f}_{pu} \). Hence, \((F, A)\) is a soft pre-closed set of \( \tilde{X} \).

**Lemma 2.4.** Let \( \{(X_i, A_i) : i \in I\} \) be a family of soft topological spaces, \( (X, A) = \prod_{i=1}^{n} (X_i, A_i) \) the product space and \( (F, A) = \prod_{i=1}^{n} (F_i, A_i) \) a non-empty subset of \( (X, A) \), where \( n \) is a positive integer and \( A_{ij} \) is a subset of \( (X_{ij}, A_{ij}) \). Then \( A_{ij} \tilde{\in} \tilde{S}PO(X_{ij}, A_{ij}) \) for each \( i \leq j \leq n \) if and only if \( (F, A) \tilde{\in} \tilde{S}PO(X, A) \).

**Theorem 2.8.** Let \( \{(X_i, A) : i \in I\} \) and \( \{(Y_i, A) : i \in I\} \) be any two families of topological spaces. For each \( i \in I \), let \( \tilde{f}_{pu} : (X_i, A) \to (Y_i, A) \) be a mapping. Then, a mapping, \( \tilde{f}_{pu} : \prod (X_i, A_i) \to \prod (Y_i, A_i) \), defined by \( \tilde{f}_{pu}(x_i) = (\tilde{f}_{pu}(x_i)) \) is s.p.c., if and only if for each \( i \in I \).

**Proof.** Necessity: For each fixed \( i_\alpha \in I \), let \( p_{i_\alpha} : \prod (Y_i, A_i) \to (Y_{i_\alpha}, A_{i_\alpha}) \), be the projection. Suppose, \( V_{i_\alpha} \) is an arbitrary open set in \( (Y_{i_\alpha}, A_{i_\alpha}) \). Then \( P_{i_\alpha}^{-1}(V_{i_\alpha}) = (V_{i_\alpha}) \times \prod_{i \neq i_\alpha} (X_i, A_i) \) is open in \( \prod (Y_i, A_i) \). Since \( \tilde{f}_{pu} \) is s.p.c., \( \tilde{f}_{pu}^{-1}(p_{i_\alpha}(V_{i_\alpha})) = \tilde{f}_{pu,i_\alpha} \times \prod_{i \neq i_\alpha} (X_i, A_i) \) is soft pre-open in \( \prod (X_i, A_i) \). Then by Lemma-2.4, \( \tilde{f}_{pu,i_\alpha}(V_{i_\alpha}) \in \tilde{S}PO(X_{i_\alpha}, A_{i_\alpha}) \). Therefore, \( \tilde{f}_{pu,i_\alpha} \) is s.p.c., Sufficiency: If each \( \tilde{f}_{pu,i_\alpha} \) is soft pre continuous then \( \tilde{f}_{pu} \) is also s.p.c.

3 Conclusion

Soft pre open sets and soft pre continuous functions have the same properties as those of pre open sets and pre continuous functions. Hence in case of vague sets, soft sets will be of use to study above the objects. More research could be done in this area to facilitate research in other areas like Bio Science, Engineering, Decision making, etc...

References


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