On Intuitionistic Fuzzy Weakly π Generalized Continuous Mapping

K. Kadambavanam, PhD
PG and Research Department of Mathematics,
Sri Vasavi College,
Erode-638 316,
Tamilnadu, India.

K. Vaithiyalingam
Assistant Professor
Department of Mathematics,
Kongu Engineering College, Perundurai, Erode-638 052, Tamilnadu, India.

ABSTRACT
The purpose of this paper is to introduce and study the concepts of intuitionistic fuzzy weakly π generalized continuous mappings defined on intuitionistic fuzzy topological space. Some of its properties are derived.

Keywords
Intuitionistic fuzzy topology, intuitionistic fuzzy weakly π generalized closed set and open set, intuitionistic fuzzy weakly π generalized continuous mappings, intuitionistic fuzzy $w\pi T_{1/2}$ space and intuitionistic fuzzy $w\pi gT_q$ space.

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1. INTRODUCTION
The concept of fuzzy sets was introduced by Zadeh [16] in 1965. Then this concept was generalized into intuitionistic fuzzy (IF) by Atanassov [1] in 1986. After the introduction of IF sets, many research articles have been published in the study of examining and exploring, how far the basic concepts and theorems, defined in crisp sets and in fuzzy sets remain true in the new environment. The concept of fuzzy topology was introduced by Chang [3] in 1968. In 1997, Coker [4] initiated the concept of generalization of fuzzy topology into IF topology. The apprehension of semi closed, α closed, semi pre-closed, weakly closed had been introduced in his paper. Further their properties are derived.

In this paper, the concept of IF weakly π generalized continuous mappings is introduced and studied with examples. The derivations of some of its properties are done. Illustrations are given to testify the derived results.

This paper is organized into five sections. In the first section historical development of the concepts were discussed. Second section is devoted for basic definitions and results, needed for this work. Section three discusses the IF weakly π generalized continuous mappings. Suitable examples are given in each section. Application of the concepts introduced in section three is studied on $IFw\pi T_{1/2}$ space and $IFw\pi gT_q$ space into section four. Conclusion of this study is in section five.

2. PRELIMINARIES
Definition 2.1: Let X be a non-empty crisp set. An intuitionistic fuzzy (IF) set A in X is defined as an object of the form [1]

$A = \{ < x, \mu_A(x), \nu_A(x) > \mid x \in X \}$,

where the functions $\mu_A(x) : X \to [0,1]$ and $\nu_A(x) : X \to [0,1]$ denote the degree of membership (namely μ_A) and the degree of non-membership (namely ν_A) of each element $x \in X$ to the set A, respectively, and $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ for each $x \in X$. The set of all intuitionistic fuzzy sets in X is denoted by IFS(X).

Definition 2.2: Let A and B be IFSs of the form [1],

$A = \{ < x, \mu_A(x), \nu_A(x) > \mid x \in X \}$,

$B = \{ < x, \mu_B(x), \nu_B(x) > \mid x \in X \}$.

The operations ∧ and ∨ are defined on $\mu_A(x), \mu_B(x), \nu_A(x)$, and $\nu_B(x)$ as follows,

$\mu_A(x) \wedge \mu_B(x) = \min \{ \mu_A(x), \mu_B(x) \}$,

$\nu_A(x) \vee \nu_B(x) = \max \{ \nu_A(x), \nu_B(x) \}$,

$\mu_A(x) \vee \mu_B(x) = \max \{ \mu_A(x), \mu_B(x) \}$ and

$\nu_A(x) \wedge \nu_B(x) = \min \{ \nu_A(x), \nu_B(x) \}$. Then,

i) $A \subseteq B$ if and only if $\mu_A(x) \leq \mu_B(x)$ and $\nu_A(x) \geq \nu_B(x)$ for all $x \in X$, similarly $A \supseteq B$ can be defined,

ii) $A = B$ if and only if $A \subseteq B$ and $B \subseteq A$,

iii) $A^C = \{ < x, \nu_A(x), \mu_A(x) > \mid x \in X \}$, here the membership grade of x in A is the non- membership grade of x in A^C and vice versa,

iv) $A \cap B = \{ < x, \mu_A(x) \wedge \mu_B(x), \nu_A(x) \vee \nu_B(x) > \mid x \in X \}$, and

v) $A \cup B = \{ < x, \mu_A(x) \vee \mu_B(x), \nu_A(x) \wedge \nu_B(x) > \mid x \in X \}$.

For the sake of simplicity, the notation

$A = < x, \mu_A, \nu_A >$ is used instead of

$A = \{ < x, \mu_A(x), \nu_A(x) > \mid x \in X \}$.

The intuitionistic fuzzy sets $0_\sim$ and $1_\sim$ are defined respectively as, $0_\sim = \{ < x, 0, 1 > \mid x \in X \}$ and

$1_\sim = \{ < x, 1, 0 > \mid x \in X \}$. The sets $0_\sim$ and $1_\sim$ are known as the empty set and the whole set of X respectively.

Definition 2.3: An intuitionistic fuzzy topology (IFT) is a family τ of IFS defined on X satisfying the following axioms [4],

i) $0_\sim, 1_\sim \in \tau$,

ii) $G_1 \cap G_2 \in \tau$, for any $G_1, G_2 \in \tau$,

iii) $\cup G_i \in \tau$ for any arbitrary family $\{ G_i \mid i \in J \} \subseteq \tau$.

Then the pair (X, τ) is called an intuitionistic fuzzy topological space (IFTS) and any IFS in τ is known as an intuitionistic fuzzy open set (IFOS) in X.

The complement A^C of an IFOS, A in an IFTS (X, τ) is called an intuitionistic fuzzy closed set (IFCS) in X.

Definition 2.4: Let (X, τ) be an IFTS and

$A = < x, \mu_A, \nu_A >$ be an IFS in X. Then the intuitionistic fuzzy closure and an intuitionistic fuzzy interior are defined by [4],

$\mathrm{cl}(A) = \cap \{ G \mid G$ is an IFCS in X and $A \subseteq G\}$, and

$\mathrm{int}(A) = \cup \{ K \mid K$ is an IFOS in X and $K \subseteq A\}$.

Note that for any IFS, A in (X, τ), $\mathrm{cl}(A^C) = (\mathrm{int}(A))^c$ and $\mathrm{int}(A^c) = (\mathrm{cl}(A))^c$.

Definition 2.5: An IFS, $A = < x, \mu_A, \nu_A >$ in an IFTS(X, τ) is said to be an

i) intuitionistic fuzzy closed set [4] (IFCS) in X $\Leftrightarrow$ $\mathrm{cl}(A) = A$, and

ii) intuitionistic fuzzy open set [4] (IFOS) in X $\Leftrightarrow$ $\mathrm{int}(A) = A$.

Definition 2.6: A subset A of a space (X, τ) is called

i) regular open [11] if $A = \mathrm{int}(\mathrm{cl}(A))$, and

ii) π open [11] if A is the union of regular open sets,

symbolically A is an IFπOS in X.

Definition 2.7: An IFS, $A = < x, \mu_A, \nu_A >$ in an IFTS(X, τ) is said to be an

i) intuitionistic fuzzy semi closed set [5] (IFSCS) if $\mathrm{int}(\mathrm{cl}(A)) \subseteq A$, and

ii) intuitionistic fuzzy semi open set [5] (IFSOS) if $A \subseteq \mathrm{cl}(\mathrm{int}(A))$.

Definition 2.8: Let A be an IFS of an IFTS (X, τ). Then the semi closure of A $(\mathrm{scl}\,(A))$ and semi interior of A $(\mathrm{sint}\,(A))$ are defined as [14] ,

$\mathrm{scl}(A) = \cap \{ G \mid G$ is an IFSCS in X and $A \subseteq G\}$, and

$\mathrm{sint}(A) = \cup \{ K \mid K$ is an IFSOS in X and $K \subseteq A\}$.

Result 2.1: Let A be an IFS in (X, τ), then [12]

i) $\mathrm{scl}(A) = A \cup \mathrm{int}(\mathrm{cl}(A))$, and

ii) $\mathrm{sint}(A) = A \cap \mathrm{cl}(\mathrm{int}(A))$.

Definition 2.9: An IFS $A = < x, \mu_A, \nu_A >$ in an IFTS(X, τ) is said to be an

i) intuitionistic fuzzy α closed set [5] (IFαCS) if $\mathrm{cl}\left(\mathrm{int}(\mathrm{cl}(A))\right) \subseteq A$, and

ii) intuitionistic fuzzy α open set [5] (IFαOS) if $A \subseteq \mathrm{int}\left(\mathrm{cl}(\mathrm{int}(A))\right)$.

Definition 2.10: Let $A = < x, \mu_A, \nu_A >$ be an IFS of an IFTS (X, τ). Then the α closure of A ($\alpha\,\mathrm{cl}(A)$) and α interior of A $(\alpha\,\mathrm{int}(A))$ are defined as [9],
$\alpha\,\mathrm{cl}(A) = \cap \{ G \mid G$ is an IFαCS in X and $A \subseteq G\}$,

$\alpha\,\mathrm{int}\,(A) = \cup \{ K \mid K$ is an IFαOS in X and $K \subseteq A\}$.

Result 2.2: Let A be an IFS in (X, τ), then [9]

i) $\alpha\,\mathrm{cl}(A) = A \cup \mathrm{cl}\left(\mathrm{int}(\mathrm{cl}(A))\right)$, and

ii) $\alpha\,\mathrm{int}(A) = A \cap \mathrm{int}\left(\mathrm{cl}(\mathrm{int}(A))\right)$.

Definition 2.11: An IFS, $A = < x, \mu_A, \nu_A >$ in an IFTS (X, τ) is said to be an

i) intuitionistic fuzzy pre-closed set [5] (IFPCS) if, $\mathrm{cl}(\mathrm{int}(A)) \subseteq A$,

ii) intuitionistic fuzzy regular closed set [5] (IFRCS) if, $\mathrm{cl}(\mathrm{int}(A)) = A$,

iii)intuitionistic fuzzy generalized closed set [13]

(IFGCS) if, $\mathrm{cl}(A) \subseteq U$ whenever $A \subseteq U$, U is an

IFOS in X,

iv)intuitionistic fuzzy generalized semi closed set [10]

(IFGSCS) if, $\mathrm{scl}(A) \subseteq U$ whenever $A \subseteq U$, U is

an IFOS in X,

v) intuitionistic fuzzy α generalized closed set [9]

(IFαGCS) if, $\alpha\,\mathrm{cl}(A) \subseteq U$ whenever $A \subseteq U$,U is

an IFOS in X.

Definition 2.12: An IFS, A is said to be an intuitionistic fuzzy weakly π generalized closed set [7] (IFWπGCS) in (X, τ), if $\mathrm{cl}(\mathrm{int}(A)) \subseteq U$ whenever $A \subseteq U$ and U is an IFπOS in X.

The family of all IFWπGCS of an IFTS (X, τ) is denoted by IFWπGCS(X).

Result 2.3: Every IFCS, IFαCS, IFGCS, IFRCS, IFPCS, IFαGCS are IFWπGCS [7] but the converse need not be true.

Definition 2.13: An IFS, A is said to be an intuitionistic fuzzy weakly π generalized open set [7] (IFWπGOS) in (X, τ) if, the complement A^c is an IFWπGOS in X.

The family of all IFWπGOS of an IFTS (X, τ) is denoted by IFWπGOS (X).

Definition 2.14: An IFTS (X, τ) is called an intuitionistic fuzzy w$\pi T_{1/2}$ space (IF w$\pi T_{1/2}$) [7], if every IFWπGCS in X is an IFCS in X.

Definition 2.15: An IFTS (X, τ) is called an intuitionistic fuzzy wπgT_q space (IF wπgT_q) [7], where

$0 < q < 1$, if every IFWπGCS in X is an IFPCS in X.

Definition 2.16: Let f be a mapping from an IFTS (X, τ) into IFTS (Y, σ). Then f is said to be intuitionistic fuzzy continuous [5] (IF cts) if, $f^{-1}(B) \in$ IFOS (X) for every $B \in \sigma$.

Definition 2.17: Let f be a mapping from an IFTS (X,τ) into IFTS(Y,σ). Then f is said to be

i) intuitionistic fuzzy semi continuous [15] (IFS cts) if, $f^{-1}(B) \in$ IFSO(X) for every $B \in \sigma$,

ii) intuitionistic fuzzy α continuous [15] (IFα cts) if, $f^{-1}(B) \in$ IFαO(X) for every $B \in \sigma$,

iii)intuitionistic fuzzy pre continuous [15] (IFP cts) if, $f^{-1}(B) \in$ IFPO(X) for every $B \in \sigma$,

iv)intuitionistic fuzzy regular continuous [15] (IFR cts)

if, $f^{-1}(B) \in$ IFRO(X) for every $B \in \sigma$.

Definition 2.18: Let f be a mapping from an IFTS (X,τ) into IFTS (Y,σ). Then f is said to be intuitionistic fuzzy generalized continuous [10]

(IFG cts) if, $f^{-1}(B) \in$ IFGCS (X) for every IFCS, B in Y.

Definition 2.19: A mapping $f: (X,\tau) \to (Y,\sigma)$ is called intuitionistic fuzzy generalized semi continuous [9] (IFGS cts) if, $f^{-1}(B)$ is an IFGSCS in (X,τ) for every IFCS, B of (Y,σ).

Definition 2.20: A mapping $f: (X,\tau) \to (Y,\sigma)$ is called intuitionistic fuzzy α generalized continuous [9]

(IFαGS cts) if, $f^{-1}(B)$ is an IFαGCS in (X,τ) for every IFCS, B of (Y,σ).

3. INTUITIONISTIC FUZZY WEAKLY π GENERALIZED CONTINUOUS MAPPINGS

In this section, intuitionistic fuzzy weakly π generalized continuous mappings is defined. Some of its properties are derived.

Definition 3.1: A mapping $f: (X,\tau) \to (Y,\sigma)$ is called an intuitionistic fuzzy weakly π generalized continuous mapping (IFWπG cts) if, $f^{-1}(B)$ is an IFWπGCS in (X,τ) for every IFCS, B of (Y,σ).

Example 3.1: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.2, 0.2), (0.6, 0.7) >$,

$G_2 = < y, (0.6, 0.7), (0.4, 0.2) >$. Then

$\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X,\tau) \to (Y,\sigma)$ by $f(a) = u$ and $f(b) = v$. Then f is an IFWπG continuous mapping.

Proposition 3.1: Every IF continuous mapping is an IFWπG continuous mapping but not conversely.

Proof: Let $f: (X,\tau) \to (Y,\sigma)$ be an IF continuous mapping. Let B be an IFCS in Y. Since f is IF continuous mapping, $f^{-1}(B)$ is an IFCS in X. Since every IFCS is an IFWπGCS, $f^{-1}(B)$ is an IFWπGCS in X. Therefore f is an IFWπG continuous mapping.

Example 3.2: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.1, 0.2), (0.8, 0.7) >$,

$G_2 = < y, (0.8, 0.7), (0.1, 0.3) >$. Then

$\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X,\tau) \to (Y,\sigma)$ by $f(a) = u$ and $f(b) = v$. The IFS, $B = < y, (0.1, 0.3), (0.8, 0.7) >$ is IFCS in Y. Then $f^{-1}(B)$ is IFWπGCS in X, but not IFCS in X. Therefore f is an IFWπG continuous mapping but not an IF continuous mapping.

Proposition 3.2: Every IFα continuous mapping is an IFWπG continuous mapping but not conversely.

Proof: Let $f: (X,\tau) \to (Y,\sigma)$ be an IFα continuous mapping. Let B be an IFCS in Y. Then by definition $f^{-1}(B)$ is an IFαCS in X. Since every IFαCS is an IFWπGCS, $f^{-1}(B)$ is an IFWπGCS in X. Thus f is an IFWπG continuous mapping.

Example 3.3: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.4, 0.3), (0.6, 0.5) >$,

$G_2 = < y, (0.2, 0.3), (0.5, 0.4) >$. Then

$\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X,\tau) \to (Y,\sigma)$ by $f(a) = u$ and $f(b) = v$. The IFS, $B = < y, (0.5, 0.4), (0.2, 0.3) >$ is IFCS in Y. Then $f^{-1}(B)$ is IFWπGCS in X, but not IFαCS in X. Then f is an IFWπG continuous mapping but not an IFα continuous mapping.

Proposition 3.3: Every IFR continuous mapping is an IFWπG continuous mapping but not conversely.

Proof: Let $f: (X,\tau) \to (Y,\sigma)$ be an IFR continuous mapping. Let B be an IFCS in Y. Then by definition $f^{-1}(B)$ is an IFRCS in X. Since every IFRCS is an IFWπGCS, $f^{-1}(B)$ is an IFWπGCS in X. So, f is an IFWπG continuous mapping.

Example 3.4: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.5, 0.4), (0.4, 0.5) >$,

$G_2 = < y, (0.5, 0.5), (0.4, 0.3) >$. Then

$\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X,\tau) \to (Y,\sigma)$ by $f(a) = u$ and $f(b) = v$. The IFS, $B = < y, (0.4, 0.3), (0.5, 0.5) >$ is IFCS in Y. Then $f^{-1}(B)$ is IFWπGCS in X, but not IFRCS in X. Therefore f is IFWπG continuous mapping but not an IFR continuous mapping.

Proposition 3.4: Every IFP continuous mapping is an IFWπG continuous mapping but not conversely.

Proof: Let $f: (X,\tau) \to (Y,\sigma)$ be an IFP continuous mapping. Let B be an IFCS in Y. Then $f^{-1}(B)$ is an IFPCS in X. Since every IFPCS is an IFWπGCS, $f^{-1}(B)$ is an IFWπGCS in X. Therefore f is an IFWπG continuous mapping.

Example 3.5: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.4, 0.3), (0.6, 0.7) >$,

$G_2 = < y, (0.6, 0.4), (0.4, 0.4) >$.
Then $\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X,\tau) \to (Y,\sigma)$ by $f(a) = u$ and $f(b) = v$. The IFS, $B = < y, (0.4, 0.4), (0.6, 0.4) >$ is IFCS in Y. Then $f^{-1}(B)$ is

IFWπGCS in X, but not IFPCS in X. Therefore f is IFWπG continuous mapping but not an IFP continuous mapping.

Proposition 3.5: Every IFG continuous mapping is an IFWπG continuous mapping but not conversely.

Proof: Let $f: (X, \tau) \rightarrow (Y, \sigma)$ be an IFG continuous mapping. Let B be an IFCS in Y. Since f is an IFG continuous mapping, $f^{-1}(B)$ is an IFGCS in X. Since every IFGCS is an IFWπGCS, $f^{-1}(B)$ is an IFWπGCS in X. Thus f is an IFWπG continuous mapping.

Example 3.6: Let $X = \{a, b\}$, $Y = \{u, v\}$ and $G_1 = < x, (0.2, 0.3), (0.7, 0.6) >$,

$G_2 = < y, (0.8, 0.7), (0.2, 0.2) >$. Then $\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X, \tau) \rightarrow (Y, \sigma)$ by $f(a) = u$ and $f(b) = v$. The IFS, $B = < y, (0.2, 0.2), (0.8, 0.7) >$ is IFCS in Y, $f^{-1}(B)$ is IFWπGCS in X but not IFGCS in X. Therefore f is IFWπG continuous mapping but not an IFG continuous mapping.

Proposition 3.6: Every IFαG continuous mapping is an IFWπG continuous mapping but not conversely.

Proof: Let $f: (X, \tau) \rightarrow (Y, \sigma)$ be an IFαG continuous mapping. Let B be an IFCS in Y. Then by definition, $f^{-1}(B)$ is an IFαGCS in X. Since every IFαGCS is an IFWπGCS, $f^{-1}(B)$ is an IFWπGCS in X. So, f is an IFWπG continuous mapping.

Example 3.7: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.4, 0.6), (0.2, 0.2) >$,

$G_2 = < y, (0.6, 0.2), (0.4, 0.3) >$. Then $\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X, \tau) \rightarrow (Y, \sigma)$ by $f(a) = u$ and $f(b) = v$. The IFS, $B = < y, (0.4, 0.3), (0.6, 0.2) >$ is IFCS in Y. Then $f^{-1}(B)$ is IFWπGCS in X, but not IFαGCS in X. Therefore f is IFWπG continuous mapping but not an IFαG continuous mapping.

Remark 3.1: IFS continuous mapping and IFWπG continuous mapping are independent to each other.

Example 3.8: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.4, 0.3), (0.6, 0.7) >$,

$G_2 = < y, (0.6, 0.7), (0.4, 0.3) >$. Then $\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X, \tau) \rightarrow (Y, \sigma)$ by $f(a) = u$ and $f(b) = v$. Then f is IFS continuous mapping but not an IFWπG continuous mapping, since $B = < y, (0.4, 0.3), (0.6, 0.2) >$ is an IFSCS in Y, but $f^{-1}(B) = < x, (0.4, 0.3), (0.6, 0.2) >$ is not an IFWπGCS in X.

Example 3.9: Let $X = \{a, b\}$, $Y = \{u, v\}$ and

$G_1 = < x, (0.9, 0.7), (0.1, 0.2) >$,

$G_2 = < y, (0.3, 0.4), (0.7, 0.6) >$. Then $\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X, \tau) \rightarrow (Y, \sigma)$ by $f(a) = u$ and $f(b) = v$. Then f is IFWπG continuous mapping, but not an IFS continuous mapping, since $B = < y, (0.7, 0.6), (0.3, 0.4) >$ is an IFWπGCS in Y, but $f^{-1}(B) = < x, (0.7, 0.6), (0.3, 0.4) >$ is not an IFSCS in X.

Remark 3.2: IFGS continuous mapping and IFWπG continuous mapping are independent to each other.

Example 3.10: Let $X = \{a, b\}$, $Y = \{u, v\}$ and $G_1 = < x, (0.2, 0.3), (0.5, 0.5) >$,

$G_2 = < y, (0.5, 0.5), (0.2, 0.3) >$. Then

$\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X, \tau) \rightarrow (Y, \sigma)$ by $f(a) = u$ and $f(b) = v$. Then f is IFGS continuous mapping, but not an IFWπG continuous mapping, since $B = < y, (0.2, 0.3), (0.5, 0.5) >$ is an IFGSCS in Y, but $f^{-1}(B) = < x, (0.2, 0.3), (0.5, 0.5) >$ is not an IFWπGCS in X.

Example 3.11: Let $X = \{a, b\}$, $Y = \{u, v\}$ and $G_1 = < x, (0.5, 0.6), (0.2, 0.2) >$,

$G_2 = < y, (0.6, 0.6), (0.3, 0.2) >$. Then $\tau = \{ 0_\sim, G_1, 1_\sim \}$ and $\sigma = \{ 0_\sim, G_2, 1_\sim \}$ are IFTs on X and Y respectively. Define a mapping

$f: (X, \tau) \rightarrow (Y, \sigma)$ by $f(a) = u$ and $f(b) = v$. Then f is IFWπG continuous mapping, but not an IFGS continuous mapping, since $B = < y, (0.3, 0.2), (0.6, 0.6) >$ is an IFWπGCS in Y but $f^{-1}(B) = < x, (0.3, 0.2), (0.6, 0.6) >$ is not an IFGSCS in X.

Remark 3.3: The derived relationship among the terms can be schematically presented as follows.

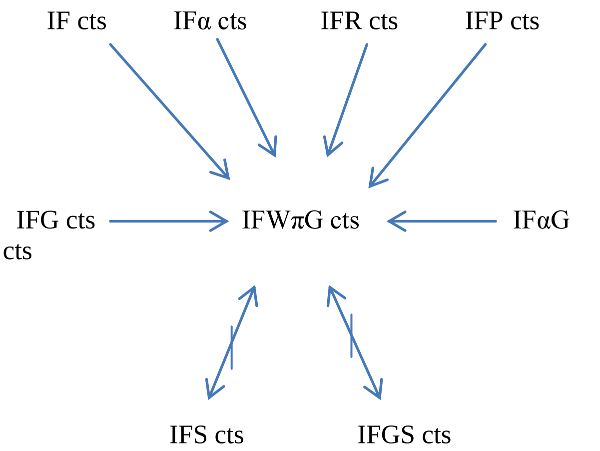

Fig.3.1 Relationships between the intuitionistic fuzzy weakly π generalized continuous mapping, and the other existing continuous mapping on intuitionistic fuzzy closed sets.

4. APPLICATIONS OF INTUITIONISTIC FUZZY WEAKLY π GENERALIZED CLOSED MAPPING

Proposition 4.1: A mapping f: $(X,\tau) \to (Y,\sigma)$ is IFWπG continuous, then the inverse image of each IFOS in Y is an IFWπGOS in X.

Proof: Let B be an IFOS in Y. This implies B^c is IFCS in Y. Since f is IFWπG continuous, $f^{-1}(B^c)$ is IFWπGCS in X. Since $f^{-1}(B^c) = \left(f^{-1}(B)\right)^c$, $f^{-1}(B)$ is an IFWπGOS in X.

Proposition 4.2: Let f: $X \to Y$ be an IFWπG continuous mapping and X be an IFw$\pi T_{1/2}$ space. Then f is an IF continuous mapping.

Proof: Let X be an IFw$\pi T_{1/2}$ space and B be an IFCS in Y. Then by definition (2.14), $f^{-1}(B)$ is an IFWπGCS in X. So, $f^{-1}(B)$ is an IFCS in X. Therefore f is an IF continuous mapping.

Proposition 4.3: Let f: $X \to Y$ be an IFWπG continuous mapping and X be an IFw$\pi g T_q$ space, where 0 < q < 1. Then f is an IFG continuous mapping.

Proof: Let X be an IFw$\pi g T_q$ space, B be an IFCS in Y. Then by definition (2.15), $f^{-1}(B)$ is an IFWπGCS in X. So, $f^{-1}(B)$ is an IFGCS in X. Thus f is a IFG continuous mapping.

Proposition 4.4: A mapping f: $(X,\tau) \to (Y,\sigma)$ be an IFWπG continuous mapping and g: $(Y,\sigma) \to (Z,\delta)$ is

IF continuous, then $g \circ f : (X,\tau) \to (Z,\delta)$ is an IFWπG continuous.

Proof: Let D be an IFCS in Z. Then by definition $g^{-1}(D)$ is an IFCS in Y. Since f is an IFWπG continuous mapping, inverse image of a IFCS in Y is a IFWπGCS in X. ie., $f^{-1} \circ \left(g^{-1}(D)\right) = (g \circ f)^{-1}(D)$ is an IFWπGCS in X. Therefore $g \circ f$ is a IFWπG continuous mapping.

5. CONCLUSION

In this paper, a special type of IF cts mapping , namely IFWπG continuous mapping is introduced. Their relationships have been studied. Some of the basic properties of intuitionistic fuzzy weakly π generalized continuous mapping are derived. Also the relationship among the intuitionistic fuzzy weakly π generalized continuous mapping and other existing intuitionistic fuzzy continuous mappings are obtained. It is given, schematically in figure (3.1).

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