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Research paper

A New Type of ^{a}Contra Continuous Functions

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Abstract

In this article, the author present the another class of functions which is called a contra generalized αb - continuous function in topological spaces. A few portrayals and properties identified with contra $g\alpha b$ - continuous functions are to be obtained.

Keywords*: $g\alpha b$ - SetO, $g\alpha b$ -continuity, contra $g\alpha b$ -continuity.*

1. Introduction

Dontchev presented the thoughts of ^{a}contra continuous function on 1970. Another class of capacity called contra b-continuous presented by Nasef. The researchers M. S. M. Noorani and A. A. Omari have examined advanced properties of b-^{a}function on 2009. This article, the presentation of the new idea of contra $g\alpha b$ - continuous and concentrate a portion of the utilizations of this function. We additionally present and concentrate two new spaces called $g\alpha b$ -^{H}Hausdorff spaces, $g\alpha b$ - normal spaces and get some new outcomes. Through this article (X,τ) and (Y,σ) stands for the non-empty topological spaces. Let $X \supseteq A$ will be indicated by $\operatorname{int}(A)$ and $closer(A)$ separately, the set X $g\alpha b$ - is union of all Set^{O} in set^{C} with A is called $g\alpha b$ - interior of A then which is signified $g\alpha b$ - $\operatorname{int}(A)$, the point of intersection all $g\alpha b$ - sets of X is in A called $g\alpha b$ - closure of A and it is meant by $g\alpha b$ - $closure(A)$.

Assumption: ^{a}function – Contra Continuous Function, Set^{O}–Open Set, spaces –^{H}Hausdorff spaces, closed set-set^{C}

2. Preliminary

Definition 2.1: Assume that A be the subset A for the space (X,τ), which is known as

(i) Semi-Set^{O} when $clo(in(A)) \supseteq A$

(ii) α -Set^{O} when $in(clo(in(A))) \supseteq A$

(iii) b -Set^{O} when $clo(in(A)) \cup in(clo(A)) \supseteq A$

(iv) Pre-Set^{O} when $in\ (cl\ (A)) \supseteq A$

(v) $clo(A) \subseteq U$, whatever $A \subseteq U$,

(vi) b -set^{C} , when $bclo(A) \subseteq U$ if $A \subseteq U$, U is open in X .

(vii) Pre-set^{C} generalized semi- set, when $spr(A) \subseteq U$, $A \subseteq U$ with U is open in X.

$(viii)$ Generalized b-semi set^{C} set when $bclo(A) \subseteq U$. if $A \subseteq U$ and U is semi open in X.

(ix) Pre-regular generalized set^{C} set when $pclo(A) \subseteq U$,

(x) Set^{C} α b-generalized when $bclo(A) \subseteq U$,

(xii) Semi generalized set^{C} set with the condition $sclo(A) \subseteq U$.

Definition 2.2: Assume that $(Y,\sigma) \rightarrow f:(X,\tau)$ is known as a

(1) Contra pre, when $f^{-1}(V)$ is pre-set^{C} in (X,τ) any Set^{O} V of (Y,σ).

(2) b-^{a}function when $f^{-1}(V)$ is b-set^{C} in (X,τ) any Set^{O} V of (Y,σ).

(3) gpr-^{a}function when $f^{-1}(V)$ is to be gpr-set^{C} in (X,τ) meant any Set^{O} V of (Y,σ).

(4) Contra gb-continuous when $f^{-1}(V)$ is to be gb-set^{C} in (X,τ) any Set^{O} V of (Y,σ).

(5) ^{a}function when $f^{-1}(V)$ is to be set^{C} in (X,τ) any Set^{O} V of (Y,σ).

(6) Contra gα -continuous with the condition $f^{-1}(V)$ is gα -setC in (X,τ) any Set^{O} V of (Y,σ).

(7) Contra gsp-continuous when $f^{-1}(V)$ is to be gsp-set^{C} in (X,τ) any Set^{O} V of (Y,σ).

(8) Semi ^{a}function when $f^{-1}(V)$ is semi-set^{C} n (X,τ) any Set^{O} V of (Y,σ).

3. Contra generalized αb - continuous functions

In this area, The presentation of a contra generalized αb - continuous and explore a portion of their properties.

Definition 3.1: Let a function $f:(X,\tau)\to(Y,\sigma)$ is known as a generalized contra αb -continuous function and with the condition $f^{-1}(V)$ is $g\alpha b$ -set^C in (X,τ) any Set^O V of (Y,σ).

Example 3.2: Assume that the function $X=Y=\{a,b,c\}$ by way of the function $\{X,\varphi,\{a\},\{b\},\{a,b\}\}=\tau$ and $\sigma=\{Y,\varphi,\{a,b\}\}$. Let us consider another function $f:(X,\tau)(Y,\sigma)$ by $f(a)=b,\ f(b)=c,\ f(c)=a$. Obviously, $g\alpha b$ - continuous.

Definition 3.3: Assume that the subset A of the space (X,τ) then we define the set

(i) Set $\cap\{F\subset X : A\subset F\}$, F is $g\alpha b$ -set^C then the $g\alpha b$ -closure of A, which is written by $g\alpha b$ - $cl(A)$..

(ii) Set $\cup\{G\subset X : G\subset A\}$, G is Set^O and it is known as interior - $g\alpha b$ set A, which is written by $g\alpha b$ - $\mathrm{int}(A)$.

Lemma 3.4: For $x\in X, x\in g\alpha b$ iff $U\cap A=\varphi$ for any $g\alpha b$ - SetO U is in x.

Vital Part: Assume that $\forall$ a $g\alpha b$ -Set^O U is in x with the end goal that $U\cap A=\varphi$. Hence $A\subset X-U, g\alpha b-clo(A)\subset X-U$ **.** This is implies that $x\notin g\alpha b-cl(A)$. This is an inconsistency.

Adequacy part: Let assume that $x\notin g\alpha b-cl(A)$. Now $\forall$ a $g\alpha b$ -set^C subset F in A such that $x\notin F$ **.** Then $x\in X-F$ is $g\alpha b$ -open, $[(X-F)\cap A]=\varphi$. This is an inconsistency.

Theorem 3.5: Assume that function $f:(X,\tau)\to(Y,\sigma)$ be the map. The subsequent conditions are also the same:

(i) The function f were contra in $g\alpha b$ - continuous,

(ii) The quash image of every set^C set in (Y,σ) are also $g\alpha b$ - Set^O in (X,τ) **.**

(iii) Any set $x\in X$ and for every $F\in C[Y,f(x)]$ then $\forall$ $U\in[g\alpha b-op(X)]$, with the end of $f(U)\subset F$.

Proof: In case (i) $\Leftrightarrow$ (ii) and case (ii) $\Longrightarrow$ (iii) are self-evident.

(iii) $\Longrightarrow$ (ii): Assume that the function F be any set^C set of Y, then $x\in f^{-1}(F)$. If $f(x)\in F$ then $\forall$ $U_x\in g\alpha b-o(X,x)$ at extent that $f(U_x)\subset F$. So, to obtain $f^{-1}(F)=\cup\{U_x / x\in f^{-1}(F)\}$ $\in g\alpha b-op(X,x)$ **.** Hence the each inverse of each setC set in (Y,σ) is $g\alpha b$ -open in (X,τ).

$(ii)\Rightarrow(iv)$: Suppose that A be a subset of X. Assume that the set $y\notin Ker[f(A)]$. By result, the function $F\in C(Y,y)$ if $\varphi=f(A)\cap F$. We obtain the set $\varphi=A\cap f^{-1}(F)$ and the set $\varphi=g\alpha b-cl(A)\cap f^{-1}(F)$. Hence we get $\varphi=f[g\alpha b-cl(A)]\cap F$. and $y\notin f[g\alpha b-clo(A)]$. We get the result $f[g\alpha b-clo(X)]\subset Ker[f(A)]$.

Definition 3.6: Let assume that the function $f(X,\tau)\to(Y,\sigma)$ is known as $g\alpha b$ - continuous if the preimage of each open arrangement of Y is - $g\alpha b$ open in X.

Example 3.7: Suppose that set $X=Y=\{a,b,c\}$ through that $\tau=\{X,\varphi,\{a\},\{a,b\},\{a,c\}\}$ with $\sigma=\{Y,\varphi,\{a,b\}\}$. Let $f(X,\tau)\to(Y,\sigma)$ by $f(a)=f(b)=f(c)=a=b=c$ respectively. Without a doubt f is contra $g\alpha b$ -continuous, also f is not $g\alpha b$ -continuous. Since $f^{-1}[\{a,b\}]=\{b,c\}$ is unable to belongs to $g\alpha b$ -open in (X,τ), whenever $\{a,b\}$ is open in (Y,σ).

Example 3.8: Consider the set $X=Y=\{a,b,c\}$ and $\sigma=\{X,\varphi,\{ac\},\{bc\},\{b\},\{c\}\}$ with $\sigma=\{Y,\varphi,\{b\},\{b,c\}\}$ **.** Then the function $f(X,\tau)\to(Y,\sigma)$ by uniqueness function. Obviously f is a $g\alpha b$ -continuous function, also it is not a contra $g\alpha b$ -continuous. Since the reason that $\{b,c\}=f^{=1}[\{b,c\}]$ is not a contra $g\alpha b$ -set^C set in (X,τ) **.** Somewhere $\{a,b\}$ is open in (Y,σ) **.**

Theorem 3.9: Assume that $f(X,\tau)\to(Y,\sigma)$ is contra $g\alpha b$ - continuous and (Y,σ) is regular then f is $g\alpha b$ -continuous.

Proof: Let (X,τ) and V be an Set^O of (Y,σ) containing $f(x)$. Hence (Y,σ) were regular, then a Set^O W of (Y,σ) with $f(x)$ way that $clo(W)\subset V$. Since f is contra $g\alpha b$ - continuous, by result, There is a $U\in g\alpha b-Op(X,x)$ that $f(U)$ is subset of $clo(W)$. Next $f(U)\subset clo(W)\subset V$. Since f is $g\alpha b$ - continuous.

Theorem 3.10: Each ^{a}function is a contra $g\alpha b$ continuous function.

Proof: Let V be an Set^O in (Y,σ). Hence f is ^{a}function, $f^{-1}(V)$ be set^C when (X,τ). By result, Any set^C is to be $g\alpha b$ – set^C set. Therefore $f^{-1}(V)$ were $g\alpha b$ -set^C when in (X,τ). Hence f is contra $g\alpha b$ -continuous.

Example 3.11: Assume that $\{a,b,c\}=A=B$ among $\tau=\{\{a,c\},\{a\},\{c\},X,\varphi\}$ and $\sigma=\{\{a,b\},\varphi,Y\}$. To Describe the function $f:(X,\tau)\to(Y,\sigma)$ through $a=f(c)$, $b=f(a)$, and $c=f(b)$. Undoubtedly f is contra $g\alpha b$ -continuous function and f is also not ^{a}function. Since $\{a,c\}=f^{-1}[\{a,b\}]$ were not setC in (X,τ) wherever $\{a,b\}$ is open in (Y,σ).

Theorem 3.12:

(i) Any sg- ^{a}function is also a $g\alpha b$ -^{a}function.

(ii) Any $g\alpha b$ - ^{a}function is also a gs-^{a}function.

Example 3.13:
(1) Assume that the set $\{a,b,c\}=X=Y$, along $\{\{a,b\},\{a\},\{b\},\{X,\varphi\}\}=\tau$ and $\{\{a\},\{Y\},\{\varphi\}\}=\sigma$. To describe the function $f:(X,\tau)\to(Y,\sigma)$ through $a=f(c)$, $b=f(a)$, and $c=f(b)$. undoubtedly f is contra $g\alpha b$ - continuous function and f is also a not ^{a}function. Since $\{b\}=f^{-1}[\{a\}]$ were not set^{C} in (X,τ) wherever $\{a,b\}$ is open in (Y,σ).
(2) Assume that the set $\{a,b,c\}=X=Y$, along $\{\{a,b\},\{b,c\},\{b\},c\{X,\varphi\}\}=\tau$ and $\{\{a\},\{a,c\},\{Y\},\{\varphi\}\}=\sigma$. To describe the function $f:(X,\tau)\to(Y,\sigma)$ through $b=f(c)$, $c=f(a)$, and $a=f(b)$. undoubtedly f is contra $g\alpha b$ - continuous function and f is also a not ^{a}function. Since $\{b\}=f^{-1}[\{a\}]$ were not set^{C} in (X,τ) wherever $\{a,c\}$ is a Set^{O} in (Y,σ).

Example. 3.14: Suppose that $\{a,b,c\}=X=Y$, along $\{\{a,b\},\{b\},\{a\},\{X,\varphi\}\}=\tau$ and $\{\{b\},Y,\varphi\}=\sigma$. Then to describe the function $f:(X,\tau)\to(Y,\sigma)$ through $c=f(a)$, $b=f(b)$, and $a=f(c)$. Undoubtedly f is contra $sg-$ continuous function and f is also a not $g\alpha b$ - ^{a}function. Since $\{b\}=f^{-1}[\{a\}]$ were not setC in (X,τ) wherever $\{b\}$ is a Set^{O} in (Y,σ).

Example. 3.15: Assume $\{a,b,c\}=X=Y$, along $\{\{a,c\},\{c\},\{a\},\{X,\varphi\}\}=\tau$ and $\{\{a,c\},\{c\},Y,\varphi\}=\sigma$ To describe the function $f:(X,\tau)\to(Y,\sigma)$ through $a=f(c)$, $b=f(b)$ and $a=f(c)$. Undoubtedly f is contra $g\alpha b$ continuous function and f is also a not $sg-{}^{a}$function. Since $\{a,c\}=f^{-1}[\{a,c\}]$ were not setC in (X,τ) wherever $\{a,c\}$ is a Set^{O} in (Y,σ).

4. Applications

Definition: Assume that (X,τ) be the topological space, then which is called a $g\alpha b$ -Hausdorff space. When for every different points (x,y) in X , then $U\in Op(X,x)$ and $V\in g\alpha b-Op(X,y)$ with $U\cap V=\varphi$.

Egs: Suppose that set $\{a,b,c\}=X$ along $\{\{a,c\},\{b,c\},\{a,b\},\{a\},\{b\},\{c\},X,\varphi\}=\tau$ and assume that x and y are the two different points of *X*, then $g\alpha b$ -neighborhood of x and y correspondingly, then $\varphi=\{x\}\cap\{y\}$. Therefore (X,τ) is a $g\alpha b$ -^{H}space.

Theorem: Consider the topological space *X*. whos pairs are distinct point x_1 point x_2 then $f\to X$ into with the $f(x_2)\neq f(x_1)$ then f is $g\alpha b$ ^{a}function at x_2 and x_1. Also *X* is - $g\alpha b$ ^{H}space.

Proof: Suppose that *X* having the two distinct points x_2 and x_1. With the assumption that, Y be the Uryshon space and there is a function $f:X\to Y$ with the condition $f(x_2)\neq f(x_1)$ and f is $g\alpha b$ - ^{a}function at the points x_2 and x_1. Assume that $f(x_i)\neq y_i$ with $i=1,2,3,....$ and $y_2\neq y_1$. Hence *Y* is Uryshon space and there is an Set^{O}s U_{y2},U_{y1} containing with y_2 and y_1 in *Y* which is in $\varphi=Clo(U_{y2})\cap Clo(U_{y1})$. Hence f is $g\alpha b$ ^{a}function at x_2 and x_1 in X with $Clo(U_{yi})\supset f(V_{yx})$ for $i=1,2,3,...$ Therefore $\varphi=(V_{x2})\cap(V_{x1})$. Hence *X* is $g\alpha b$ -^{H}space.

Corollary: With the condition that f is $g\alpha b$ - contra $g\alpha b$ - ^{H}space.

Proof: Consider the x_1 and x_2 two different points in *X*. Through the hypothesis, $g\alpha b$ - ^{a}function in *X* into a Uryshon space *Y* such that $f(x_2)\neq f(x_1)$, because f is injective. Hence by theorem, *X* is $g\alpha b$ -^{H}space.

5. Conclusion

The classes of contra summed αb - setC frame that lies between the class of the class of ^{a}function map and gb- ^{a}function map.

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