
(/ / : / / :)

Archive of SID

(Qs) (Dr)

:

GIS

GIS

(R to V)

GIS

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()
()
()

()

()

$$R = A + B * H$$

H R B ()

$$R = -120 + 300H$$

() / ()

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(DEM)

An et al

Km²	Km²		
/	/	EM	()
/	/	Q2	
/	/	Agg	()
/	/	Cm	()
/	/	El	()
/	/	Q3	()
/	/	Ektr	()
/	/	Js	()
/	/	TRe1	
/	/	QT	()
/	/	Q1	()
/	/	Qb	()
/	/	Kgy	()
/	/	J1	()
/	/	Kt	()
/	/	Ef	()
/	/	La	
/	/	K2	()
/	/	Km	()
/	/	TRe2	
/	/	Jd	()
/	/	Ekn	
	/	Jm	
	/	Cbt	
	/	Cbr	
	/	Ekb	
	/	Ez	
	/	K3	
	/	K2c	
	/	Pd	

...

		()	
/	/	<	A
/	/		B
/	/		C
/	/		D
/	/	>	E

g / /

(R2)

/

()

()

()

()

()

()

$$a = 472.3 * 10^{0.278M} / (R + 25)^{1/3} \quad ()$$

(cm/sec²)

α

R

M

()

/

()
()

μ_X X

$$\mu(X) = \begin{cases} 0 & X > A \\ \frac{X-A}{B-A} & A < X < B \\ 1 & X > B \end{cases}$$

x B A x

()
()
(x)
()
x

Archive of SID

- Knowledge-Driven
- Bayesian
- Dempster-Shafer
- Kampel et al
- Reddy et al
- Linguistic Terms

...

A			/ -	/
B			/ /	/
C			/ /	/
D			/ /	/
E			/	/

	B	/	Em-Q2-Agg-Cm	A	/	B	/
			Js-Q3-Ek1-Qt-Q1-Kgy	B	/	C	/
			Trel-Kgy-Qb-Kt-Ef-Lava-K2-Tre2-Km-Gd-Ekn	C	/	C	/
			M-O-Gm-CCOT- CCC-CCbk- CCz	D	/	D	/
			D-Ekb-E2-K3-Kd-K2c-Pr-Pd	E	/	E	/
	B	/	< 1.°	E	/	E	/
			1.°-2.°	C	/	D	/
			2.°-3.°	C	/	C	/
			3.°-45°	C	/	C	/
			> 45°	A		B	/
	A	/	< 3. mm	E	/	E	/
			3. - 5. mm	D	/	D	/
			5. - 7. mm	C	/	C	/
			7. - 9. mm	B	/	C	/
			> 9. mm	A		A	/
	A	/	< / g	E	/	E	/
			/ /	D	/	D	/
			/ /	C	/	C	/
			/ /	B	/	B	/
			> /	A		A	/

:()

$$\mu_{Combination} = \prod_{i=1}^n \mu_i \quad ()$$

i μ_i
n

() Michael
(Qs) (Dr)

()

$$Dr = \frac{\frac{S_i}{A_i}}{\frac{\sum_i^n S_i}{\sum_i^n A_i}} \quad ()$$

i S_i
 A_i
n

Dr=

()

$$\mu_{Combination} = 1 - \prod_{i=1}^n (1 - \mu_i) \quad ()$$

Dr

-
- Fuzzy Algebraic Product
 - Decreasive
 - Fuzzy Algebraic sum
 - Increasive

...

	km2		km2	
/	/	/		
/	/	/		
/	/	/	/	
/	/	/	/	
/	/	/	/	
%	/	%		

	km2		km2	
/	/	/	/	
/	/	/	/	
/	/	/	/	
/	/	/	/	
/	/	/	/	
%	/	%		

Dr -

		Dr
/	/	
/	/	
/	/	
/	/	
/	/	

(Qs)

(Qs)

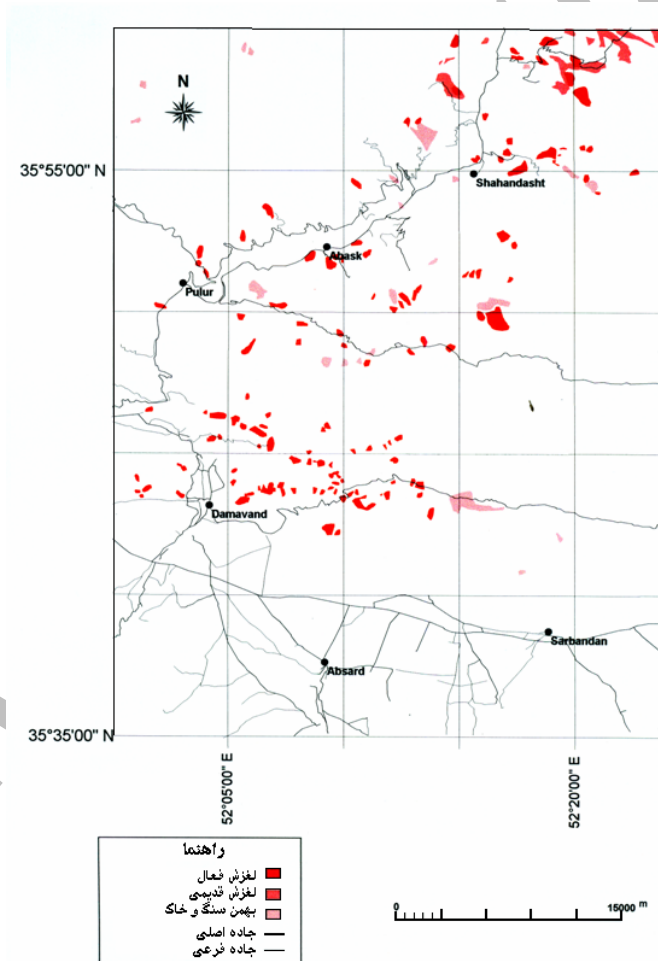
(Qs)

$$Qs = \sum_{i=1}^n ((Dr - 1)^2 * \% Area) \quad ()$$

n

i

Qs



GIS

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Predication of Natural Slope Instability Hazard Using Fuzzy Algebraic Product and Sum Operators in Central Alborz

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Abstract

In this research, results of analysis of instability hazard of natural slope using a fuzzy logic functions is presented. Fuzzy models, owing to their flexibility in evaluating propositions are more realistic than conventional models. Input datasets used to landslide hazard potential evaluation include slope map, lithology, seismic and rainfall maps. Landslide inventory maps are also used to evaluate output of models. The fuzzy algebraic product operator has an increasing trend and, in other words, because of the multiplication of the membership degree of layers in each pixel, total point tends to zero. Therefore, the high point in output pixels of the map shows its high resolution in revealing the instability of slopes. To compare the output landslide hazard zonation maps two quantitative indicators named density ratio (Dr) and quality sum (Qs) have been used. Based on Qs, output map of the fuzzy algebraic product model has sensitivity near twice of the fuzzy algebraic sum model. Based on (Dr), high hazard classes in above models have more accuracy precision as compared to low hazard classes.

Key word: Slope instability, landslide, Zonation, Fuzzy operation, Alborz