Field Parametric Geostatistics: Geostatistical rigorous solutions for highly-skewed distributions

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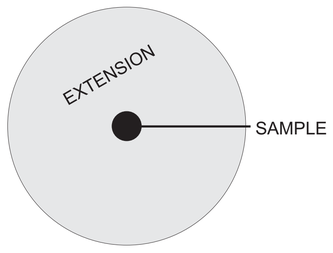
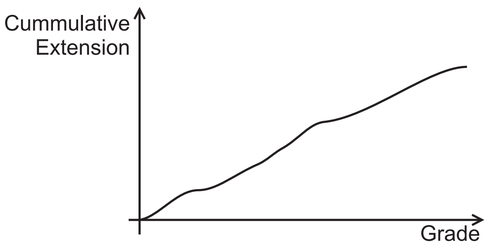
Classical Geostatistics is not able to deal with highly skewed variables (like gold)

Using FPG: NO MORE TRIMMING; NO MORE CAPPING; NO MORE CUTTING HIGH GRADES.



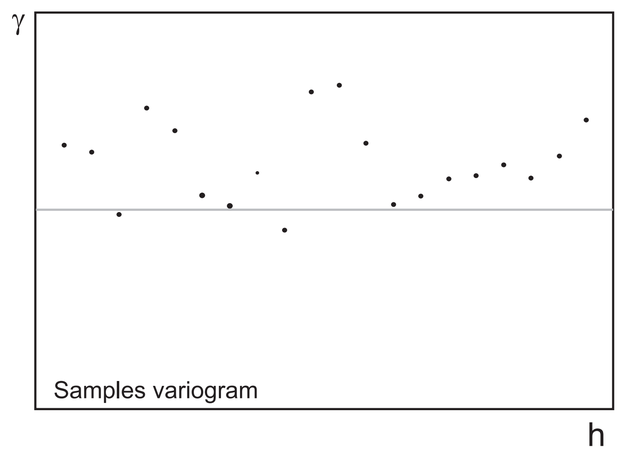
Extensions = influence of the grades

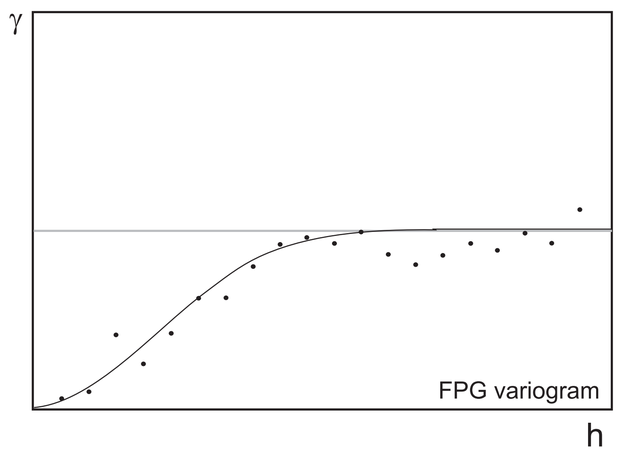
τ = EXTENSION FUNCTION ⇨



Properties of extension function:

Transforms bad or noisy variograms into well behaved variograms





Variograms for the synthetic 140 data of GSLib

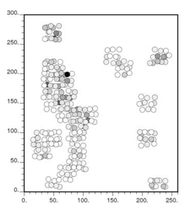
FPG lowers automatically the weight of the high grades without manual intervention by using the extension function

Procedure guidelines:

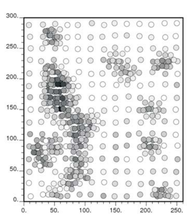
1) Data analysis → 2) FPG transform → 3) Variography → 4) Kriging → 5) Back-transform

a) Declustering procedure (if necessary);
b) Summing up for each grade the declustering results;
c) Build the cumulative function of the extensions of the grades;
d) Standardize it (from 0 to 1);
e) The cumulative extension is the new variable.

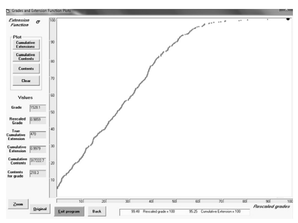
Case study: the Walker Lake data



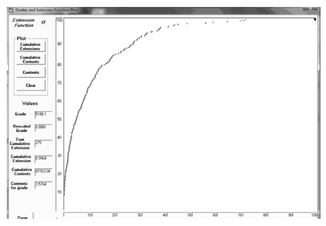
U data locations
275 samples



V data locations
470 samples



U-data extension function



V-data extension function

Reference: 78,000 samples

Using Field Parametric Geostatistics

Table 1: Statistical parameters for variables U and V

VARIABLES	COUNT	MINIMUM	MAXIMUM	MEAN	STD. DEV.	VARIANCE	COEF. OF VARIATION
U	275	0	5190.1	604.08	766.01	586769.89	1.27
U (declustered)	275	0	5190.1	555.00	684.79	468932.61	1.23
V	470	0	1528.1	435.30	299.56	89738.06	0.69
V (declustered)	470	0	1528.1	408.53	293.23	85985.06	0.72

Table 2: Statistical parameters for the U estimates

VARIABLES	COUNT	MINIMUM	MAXIMUM	MEAN	STD. DEV.	VARIANCE	COEF. OF VARIATION
U (reference)	3120	0.00	2844.55	266.04	358.81	128744.62	1.35
U (OK)	3101	52.21	2500.58	542.88	314.26	98759.35	0.58
U (capping Q97)	3120	61.86	1468.65	543.20	260.68	67954.06	0.48
U (E-type 1.5)	3120	7.20	3058.02	464.56	418.14	174841.06	0.90
U (E-type 3.0)	3120	7.20	2316.51	428.82	343.55	118026.60	0.80
U (FPG)	3042	4.84	1590.44	255.22	225.40	50805.16	0.88

Table 3: Statistical parameters for the V estimates

VARIABLES	COUNT	MINIMUM	MAXIMUM	MEAN	STD. DEV.	VARIANCE	COEF. OF VARIATION
V (reference)	3120	0.00	1378.12	277.98	228.66	52285.40	0.82
V (OK)	3120	3.81	1052.34	300.44	171.73	29491.19	0.57
V (capping Q90)	3120	8.70	814.56	304.92	153.93	23694.44	0.50
V (E-type 1.5)	3120	20.74	1295.85	302.10	217.77	47423.77	0.72
V (E-type 3.0)	3120	20.74	1125.01	296.64	202.58	41038.66	0.68
V (FPG)	3120	2.26	922.68	261.84	181.45	32924.10	0.69

FPG Software parameters screen (MAIM)