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Use Semi-Parametric and Non-Parametric Models with Missing Values / With Practical Application

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Abstract
Meditation enabled by correlating the middle of nonparametric tests as well as semi-parameterized models at the expense of forgetting values, the types of so-called tests were known, as well as semi-parameterized models. Those missing traits. After that, the meditation test may have been delivered if the area is transported through transit organizations, and the Iraqi arrivals in the areas adjacent to the values have completed those tests that are absent for nonparametric information and what is more in addition to semi-parameter information, so the aim of the study is to compare the non-parameter Parametric and semi-parametric ones in the road transport company. The study found that there is a difference in the use of non-parametric tests and the estimation process in light of missing data, and this confirmed all the results referred to by the researcher.
Keywords:missing values, the quasi-parametric, nonparametric, The nonparametric with a missing value**.**

Introduction

Missing data isan as a relatable point issue of the greater part sorts restorative research Furthermore measurable sciences also. There are separate approaches to claiming managing lost information .It incorporates straightforward and habitually utilized methods, as well as extensive information full alternately accessible Investigation from claiming statusindication, and missing data method, modulation of the overall mean.

However, these needs aid the strategies to prompt inadequate analyzes, and the additional not kidding it generally produces profoundly predisposition estimates of the cooperation's inspected there will be a greater amount complex (Embedding) on managing lost information. The quasi- parametric models' assist is worthwhile in various situations the accurate distribution of the observations is unknown. On top of everything else, a quasi- parametric model's move has statistical allowance similar to those of a log-likelihood function.

The study aims to compare non-parametric and Semi-parametric models in the land transport company with missing values.

The hypothesis of the study states that there are statistically significant differences between the Sami-parametric and non-parametric models with the missing values

We will present a descriptive study preparation to compare nonparametric and Semi-parametric data and discuss briefly road transport data Kropko et al. (2014) as often as possible, but we get off track sometimes. The main comparison measures are presented through appropriate tests for informational and semi-parameterized data, and the tables assigned to them, and the descriptive statistics for them are made and the comparison through the median because it is the method that determines the missing values.

In the study of (Xiaodan Liang, 2015) both parametric and non-parametric was explained and was of importance in human analysis, meaning that the human image is divided into many

semantic areas (for example, the right arm, the face) and this study aimed to find a developed solution that has the characteristics of two methodological, one being the supervision of the annotated data and the other being flexibility in using the newly annotated images, and a classic nonparametric inhuman analysis model with a classic nonparametric frame based on M-CNN for prediction is presented with matched confidence and better displacement in the conformational region of the test image at a given semantic region of an image one KNN. Comprehensive evaluations overit show a large dataset containing well-annotated human images from the semi-standard model of human analysis.
the study (Thomas Willem, 2017), I note that the missing data is normal and not exceptional.Multiple techniques have been developed to compute and treat this situation, the limitations are discussed with the parametric techniques used and it is suggested to use non-parametric computation techniques such as random and conditional forests.The performance of the techniques in the simulation was evaluated relative to each other, and the study found that the random and conditional forests whose calculated values are biased have worse performance than the parametric techniques.
(Julie Josse, François Hussonm 2018) The study provides one way to calculate the missing values, as it borrows an idea of the measured data depth of centrality that is defined by a random point in space that pertains to the data cloud or probability distribution. The frequency per observation is maximized for the missing values and This allows it to be used properly for any specified statistical depth function. Linear programming methods or of the Nelder-mead method have been applied to get solve and analyze quadratic, linear, or quasi-cavernous functions. Since the procedure is devoid of distribution, the embedding allows for an approximation to the geometry of the data, it is possible to predict situations in which local inclusion is not possible, and it possesses approximate properties and attractive strength under elliptical symmetry. The study found that there is a special case when using the depth of Mahalanobis for its direct connection with known methods of a multivariate model, as the methodology includes multiple assumptions regarding the data of the symmetric oval distribution.
A study (Memeshi, 2020) was applied at the Tehran Stock Exchange for the period 2009-2010 to evaluate stock indices based on semi-parametric, parametric, and nonstandard methods. The use of the Basel Committee and Bin frequency and POF tests and TUFF to evaluate the accuracy. The study concluded that the priority is given to parametric and semi-parametric models in terms of efficiency and accuracy, as well as non-parametric and quasi-parametric models that overestimated the exposure value. Although the model is non-parametric contribution is higher.

1. missing values

Missing data are a normal issue on the whole sorts for medicinal Examine. There are different systems for taking care of. Out absent information. Basic and habitually utilized systems incorporate finish alternately accessible instance analysis, those missing-indicator strategies, and in general intend ascription. (Trust, 2007) However, these routines prompt wasteful analyses and, more seriously, ordinarily handle extremely predisposition estimates of the association(s) investigated there is a greater amount complex publicizing (imputation) systems will handle lost data, for example, such that various imputation, that provides for considerably superior outcomes for these techniques, lost information for a subject would be imputed eventually Tom's perusing An worth that is predicted utilizing the sub ject'sothere, referred to aspects.

Unrecorded data hinders the analysis and calls into question the validity of the inference.The missing values in the single inclusion are dealt with and replaced with reasonable values upon entry to obtain a complete set of data, for later analysis.(Mohan Zhu et al., 2017)

1.1. Missing mechanism

Let $Yi = (Yij)^p = (Y\_i1, \cdots, Y_{ip})^T, i = 1, \cdots, n$

They are of dimensions' p and represent independent random vectors of similar distribution with a common distribution.

$F=(F)_{j=1}^{p}$ = The marginal distributions$F_j(t) = p(Y_{1i} \leq t)\ j = 1, \cdots, p$

are assumed to be either finitely discrete or continuous; corresponding to continuous or

categorical outcome variables, According to this difference, is divided$\{1. \cdots, p\} = C_1 + C_2$ into continuous(C1) and categorical (C2)components, respectively

Let $Y=Yij_{i,j}(Y_{1,} \cdots, Y_{n,})^T = (X_1, \cdots, X_P,) \in \mathbb{R}^{n \times p}$

represent the corresponding data matrix and$R=(R_{ij})$i, j $\in \{0, 1\}^{n \times p}$ matrix denotes whether

Yij , i= 1, . . . , n, & j = 1, . . . , p

is observed (R_{ij}= 1) or not (R_{ij}= 0). Further, letY_{obs} and Y_{mis}be parts of observed and missing of Y. (Robin, 1976) identified the missing mechanism using a probabilistic model, relying R on some unknown parameter-the stochastic matrix Y.

Completely missing and randomly shaped(MCAR) if$p(\mathbb{R}/Y, \varepsilon) = p(Y/\varepsilon)$

the missing and randomly shaped (MAR) if$p(\mathbb{R}/Y, \varepsilon) = p(Y_{obs}/\varepsilon)$

not missing of randomly (MNAR)if $p(\mathbb{R}/Y, \varepsilon) \neq p(Y_{obs}/\varepsilon)$

2. Quasi-parametric.

Though customary two-parameter factor reaction works would like aid used within the dissection of a take a look at precisely recently made things, it'd an opportunity to be traditional that, to some things, those factor reaction capability (IRF) will not work that info nicely. This absence of work may additionally happen the purpose once customary IRFs would like aid fitted ought to identity or psychopathology things.

The point when exploring purposes behind misfit, it will be supportive should analyze thing reaction curves (IRCs) outwardly will identify outlier things. This will be best attainable though the IRF utilized will be sufficiently adaptable should presentation deviations in the state starting with the. Standard.A Semi-parametric ofIRF that tree is made subjectively convertible toward increasing the number for parameters are counseled for this motivation. ought to create a promotion on risk underneath account, the employment of Akaike knowledge paradigm alternately theorems majority of the info paradigm goodness of shut estimation is measured a suggested of the number of parameters to is preserved. The metrics equalize the effect of the irregular slip action of the estimated claim versus the fine slip estimate of the close.The elements of a process are seen as showing much of the acting ability of action.When divided things for a capability take a look at want aid being analyzed, an outsized portion generally utilized factor reaction works (IRFs) has 2 parameters. Despite those IRFs are discovered are advantageous generally, they have ability what is a lot of there would circumstances the place they taper off with work A proportion thing. At this happens, it'd create. Whichever that the items bring flaws alternately those data bring aspects that cannot be taken care of by the IRF. during this scenario, it's going to be auxiliary to possess entry to associate convertible IRF that yields a factor reaction bend (IRC) which will show contrasts antecedently, state the center of things.

2.1. Semi-parametricfunction.

The extension of the IRF for 2PL for yield IRFs that square measure at the same time each versatile and constant can currently be thoughtabout. (Elphinstone, 1983, 1985) clear up a monotonic to polynomial–based approach for estimating AN unknown univariate distribution operate. (Sinnott, 1997) called the ‘‘filtered polynomial’’ distribution estimation methodology and extended it to a variable setting. As well, Elphinstone clears up in 1983 and1985 monotonic to polynomial based approach for estimating AN of unknown univariate distribution. As named (Sinnott, 1997) to the ‘‘filtered polynomial’’ distribution estimation methodology and the extended it to a variable prepare. As well, the overall methodology equipped by Elphinstone in 1983 is tailored to estimate AN IRF of unknown purposeful form. The chance operates applicable here for estimating AN unknown IRF is differs completely from to it utilized by Elphinstone in 1985 for estimating the distribution operate of an unknown purposeful kind. The IRF Pi(y) yields the likelihood that Associate in Nursing responder with ability y can answer such item, I, properly, unless for explicit other than that, every IRF to be thought of here is assumed

1. its increasing is ordinal
2.delimited by values (0 & 1)
3. possess an eternal differential with relevancy IRF continuous .

Suppose the purposeful style for some is (true) to IRF $\hat{P}i(\theta)$is not noted, is a noted scalar-valued operate, H(m), of a scalar A Quasi-Parametric methodology for fitting. value the argument, m, adequate for the three needs of Associate in Nursing IRF

As before: as aninstance, either for supply operates

$$H(m) = \frac{1}{1 + \exp(-m)}$$

or normal ogive

$$H(m) = \int_{-\infty}^{m} \frac{1}{\sqrt{2\pi}} \exp\,(-Z^2\ /2)dz$$

(Elphinstone, 1983) to be appropriate that there exists a minimum of one continuous monotonic perform $\widehat{m}_i(\theta)$such that

$$\hat{p}_i(\theta) = H\big(\hat{m}_i(\theta)\big)$$

$\widehat{m}_i(\theta)$is, in general, so the shape of this monotonic function is an unknown function.With that, it may be approximated to by a polynomial arbitrarily closely$m_i(\theta)$ofthe individual degree, 2ki + 1, such that $k_i > 0$, if $k_i$is made sufficiently large, (Elphinstone,1983)Thus

$$m_i(\theta) = b_{\circ i} + b_{1i}\,\theta + b_{2i}\theta^2 + \cdots + b_{2k}\theta^{2k+1} \approx \hat{m}_i(\theta)$$

with $2k_i + 2$parameters represented by the vector breparameterizationof b

Any population IRF $\hat{p}_i(\theta)$It's functional form is unknown, so it is closely approximated to an arbitrary shape by the IRF to obtain the form of a known function

$$p_i = H\,(m_i(\theta))$$

2.2.Estimation quasi-parametric

A two-stage estimation technique in light-weight of(Ramsay’s, 1991) this procedure isusedto estimate the talents and item parameters. Step one to get surrogate the valuesθ_s, s= 1, …, n, for the examinees’ talents $\hat{\theta}_s$, this surrogate's area unit the quantiles of a typical statistical distribution supported hierarchal total check score.

The vector, $\hat{\theta}$natural capacity alternatives are availableto the conditional maximum likelihood estimates, $\hat{Y}_i$, of the item parameter of vectors, given θ obtained. Assumption of the local

independence, one item is estimated at a time by minimizing the scale due to the probability of a negative record of the objective function:

$$F_i = -N^{-1} lnL\left(Y_i / y_{/i}, \hat{\theta} = -N^{-1} \sum_{s=1}^{N} y_{si} \ ln\,(p_{si}) + (1 - y_{si}) ln(1 - p_{si}) \right)$$

where $p_{si} = p_i\,(\theta)$(The scaling $-\mathrm{N}^{-1}$ appropriate because it does not depend on $F_i$sample size to getparameters, γ, And estimated values, θ, calculated to use the maximum likelihood by trying it out on data Which is randomly generated to an FMP model. After obtaining the conditional maximum likelihood of estimates by $\hat{y}=\left(\hat{Y}_1, \cdots, \hat{Y}_n\right)$

3. The nonparametric with missing value

For statistics, nonparametric tests need aid techniques about Factual examination that don't oblige a circulation should help those required presumptions to make investigated (especially Assuming that that information is not typically distributed). Because of this reason, they are now and then alluded to Similarly as distribution-free tests. Nonparametric tests incorporate various strategies Also models. The following would the vast majority of regular tests Also their comparing parametric counterparts.

for Example, that Mann-Whitney u check could be a statistic pen of the autonomous specimens t-test. The check bargains for 2 free tests that hold ordinal data. Those Wilcoxon marked rank checks could be a statistic partner of the matched specimens t-test. The check

compares 2 poverty-stricken specimens for ordinal data. The Kruskal-Wallis check is a statistic elective of the unidirectional a star. Those Kruskal-Wallis check could also be wont to analyze quite two autonomous Assemblies for ordinal data

Little Furthermore Rubin (1987) recognizes the middle of fundamentally three absent information instruments. Information is said with be “missing in random” (MAR) Assuming that those system bringing about its oversight is autonomous from claiming its (unobserved) esteem. In its oversight is also to boot autonomous of the values, that time those missing procedures are aforementioned to create “missing entirely from random” (MCAR). presumptuous that the absence methodology relies on the sneaky values, It must be mentioned: “missing not throughout random” (MNAR). Those further taken for granted approach is with substitute every lost esteem for Associate in Nursing assessed esteem (single imputation). a problem from claiming easy ascription strategies are that these may yield conflicting facet of the purpose estimates Likewise quickly regarding illustration the missingness instrument surpasses MCAR. Another issue is that the variability of the estimators is underestimated since imputed values would influencewatched values. Indeed, examining imputed info Likewise on that might need been real information, by prompts distinction estimates which might to a fault low, certainty intervals that are still slim, conjointly dangerous tests (see Schafer and Schenker, 2000). the purpose once we manage forgetting information, 2 wellsprings for questionable matter should be reflected: inspecting variability, acceptive that those model for absent info is mounted, and vulnerability owing to those reality that those system generating lost info is also obscure.

3.1. Definition nonparametric with missing value

With this method, some qualities would like aid imputed to each missing worth until the missing information is complete, say, m times, are obtained assumptions, ideally, from the distribution of prognostic Bayesian, ie the distribution of information lost in the light of the discovered information with embedded parameters outside of the previous distribution. Named to θ the parameter to estimate, thas tend to get m estimators

$\hat{\theta}_j$and m correspondingvariance estimators $\sigma^2_{\hat{\theta}_j}$. Averaging $\hat{\theta}_j$we obtain $\hat{\theta}$ the point estimator of θ. Let

- **average within imputation variance:**

$$\bar{\sigma}^2_{\hat{\theta}} = m^{-1} \sum_{j=1}^{m} \sigma^2_{\hat{\theta}_j}$$

- **between-imputation variance:**

$$\tilde{\sigma}^2_{\hat{\theta}} = (m - 1)^{-1} \sum_{j=1}^{m} (\hat{\theta}_j - \hat{\theta})^2$$

5.2. The variance of the estimator $\hat{\theta}$ is estimated by:

$$\hat{\sigma}^2_{\hat{\theta}} = \bar{\sigma}^2_{\hat{\theta}} + (1 + m^{-1})\tilde{\sigma}^2_{\hat{\theta}}$$

This formula is the famous "Rubin's Rule" (Rubin, 1987). It is usually assumed

$$\hat{\sigma}^{-1}_{\hat{\theta}} = (\hat{\theta} - \theta)$$

which allows calculating confidence intervals and tests (Rubin, 1987)

4. Applied side

The SPSS statistical program was fed with the study data, which pertains to passenger activity for travelers and delegations in Iraq during the period from 2000 to 2018(*) to conduct nonparametric and semi-parametric in the presence of missing values.

4.2.Analysis of the results

table (1)

descriptive statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
averages number of existing buses	19	1249.0000	269.74309	895.00	1934.00
number of operating buses	19	790.8947	236.45246	393.00	1388.00
passengers carried (000)	19	37084.0842	44240.60614	5642.00	149342.00
distance covered (000 Km.)	19	24722.5263	42443.37698	2148.00	179965.00
working hours of operating buses (000 h.)	19	3942.2632	3984.19716	395.00	10364.00
number of workers	19	3976.3684	1304.73915	1792.00	6207.00
wages and benefits paid (000 I.D.)	15	14385749.7333	11995588.60393	143203.00	31887595.00
Group	19	1.6316	.49559	1.00	2.00

Table (1) shows the descriptive statistics of the study sample consisting of 19 observations, as the table shows the mean, standard deviation, and also the range for both variables in the table

table (2)

Ranks			
	group	N	Mean Rank
Averags number of existing buses	max	7	7.86
	Min	12	11.25
	Total	19	
number of operating buses	max	7	9.57
	min	12	10.25
	Total	19	

Passengers carried (000)	max	7	11.71
	min	12	9.00
	Total	19	
Distance covered (000 Km.)	max	7	11.71
	min	12	9.00
	Total	19	
Working hours of operating buses (000 h.)	max	7	9.29
	min	12	10.42
	Total	19	
Number of workers	max	7	8.43
	min	12	10.92
	Total	19	
Wages and benefits paid (000 I.D.)	max	3	3.33
	min	12	9.17
	Total	15	

(*) The General Company for Passenger and Delegations Transport / Ministry of Transport

Table No. 2:It shows the upper and lower limits of each variable, as well as the order and relative importance of each variable in the presence of the missing values.The average number of buses andnumber of buses in operation, number of passengers carried, distance traveled, operating hours of operating buses, wages, number of workers, and benefits receives the wages of workers inland transport companies and in the presence of missing values.

table (3)

Test Statistics							
	The average number of existing buses	Number of the operating buses	Passengers of carried (000)	Distance of covered (000 Km.)	Working hours of the buses (000 h.)	Number of the workers	Wages and the benefits of paid (000 I.D.)
Kruskal-Wallis H	1.609	.064	1.029	1.029	.179	.865	4.083
d.f.	1	1	1	1	1	1	1
Asymp. sig.	.205	.800	.310	.310	.672	.352	.043
a. Kruskal wallis test							
b. Grouping variable\ group							

Table (3):It shows the test of Kruskal-Wallis Where the test shows the differences between the average number of busesthe number of operating buses, the transported passengers, the distance traveled, the number of operating hours for the operating buses, the number of workers, wages, and benefitspaid to workers inland transport companies and in the presence of missing the values. The test there are no statistically significant differences at the significance level of 0.01 and be the test's significant value is of statistical significance greater than 0.05.

table (4)

Chi-square tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	210.000[a]	196	.234
Likelihood ratio	81.24	196	1.00
Linear-by-linear association	7.320	1	.007

N of valid cases	15		
a. 225 cells (100.0%) have expected of count less than 5. The minimum expected count is 0.07.			

Table No. 4: It shows the test of Pearson Chi-Square Where the test shows the differences between the average number of busesthe number of operating buses, the transported passengers, the distance traveled, the number of operating hours for the operating buses, the number of workers, wages and benefitspaid to workers inland transport companies and the existence of the values missing. The test demonstrates not have statistically significant differences to the level of moral of 0.01 and that the test's significant value is of statistical significance greater than 0.05.

Table (5)

test statistics	
N	15
Kendall's W[a]	.834
Chi-square	75.086
Df	6
Asymp. sig.	.000
a. Kendall's coefficient of concordance	

Table (5):It shows the test of Kendall's W[a] where the test shows the differences between the average number of busesthe number of operating buses, the transported passengers, the distance traveled, the number of operating hours for the operating buses, the number of workers, wages and benefits paid to worker's inland transport companies and the existence of the values missing. The test demonstrates not have statistically significant differences to the level of moral of 0.01 and that the test's significant value is of statistical significance greater than 0.05.

Table (6)

Test Statistics							
	Averages number of existing buses	number of the operating buses	Passengers carried (000)	distance covered (000 Km.)	working hours of operating buses (000 h.)	number of workers	wages and benefits paid (000 I.D.)
Mann-Whitney U	27.000	39.000	30.000	30.000	37.000	31.000	4.000
Wilcoxon W	55.000	67.000	108.000	108.000	65.000	59.000	10.000
Z	-1.268	-.254	-1.014	-1.015	-.423	-.930-	-2.021
Asymp. Sig. (2-tailed)	.205	.800	.310	.310	.672	.352	.043
exact sig. [2*(1-tailed sig.)]	.227[b]	.837[b]	.340[b]	.340[b]	.711[b]	.384[b]	.048[b]
a. grouping variable: group							
b. not corrected for ties.							

table (6):It shows the test of Mann-Whitneywhere the test shows the differences between the average number of busesthe number of operating buses, the transported passengers, the distance traveled, the number of operating hours for the operating buses, the number of workers, wages, and benefits Paid to worker's inland transport companies and in the existence of the values missing. The test demonstrates not have statistically significant differences to the

level of moral of 0.01 and that the test's significant value is of statistical significance greater than 0.05.

table 3, 4,5,and 6 showthe nonparametric tests to clarify existence statistically significant differences to the presence of missing values in the data, and it was found that there are no differences between each of the Chi-Square,Mann-Whitney U, Kendall's W[a],Kruskal-Wallis, test and all the tests are a result alone when the missing values,these differences are the significant value, and that all the significant tests are greater than (0.05).

table (7)

parameter estimates		
Parameter	B	std. error
(Intercept)	16.686	0.0000
[Averages number of existing buses=895.00]	-4.814	0.0000
[Averages number of existing buses=917.00]	0.392	0.0000
[Averages number of existing buses=999.00]	-1.965	0.0000
[Averages number of existing buses=1019.00]	0.403	0.0000
[Averages number of existing buses=1109.00]	-2.550	0.0000
[Averages number of existing buses=1175.00]	0.086	0.0000
[Averages number of existing buses=1208.00]	-1.836	0.0000
[Averages number of existing buses=1219.00]	0.475	0.0000
[Averages number of existing buses=1233.00]	-0.864	0.0000
[Averages number of existing buses=1277.00]	0.592	0.0000
[Averages number of existing buses=1290.00]	-1.679	0.0000
[Averages number of existing buses=1298.00]	-2.529	0.0000
[Averages number of existing buses=1635.00]	0.462	0.0000
[Averages number of existing buses=1656.00]	0.082	0.0000
(Scale)	.000[c]	0.0000
Dependent Variable: Wages and benefits paid (000 I.D.) Model: (Intercept), The average number of buses, number of operating buses, number of passengers carried (000), distance covered (000 Km.), number of working hours of buses (000 h.)		

table (7):It showsan estimation of the parameters of the dependent variable wages and benefits paid in the presence of missing values and the influence of independent variables as well, and that there is a difference between the estimation process, the probability factor, and the tests in the existence of missing valuesbecause in the estimation process all the variables have significant differences between them at (0.000), which is less than 0.05 The statistical value specified for the comparison

5. Conclusion

Through what we have dealt with in the theoretical framework of the research, which is the knowledge of nonparametric tests and their importance, and also through the process of the quasi-likelihood model, and our exposure to it in the application, we found that there is a difference in the use of non-parametric tests and the estimation process in the existence of a missing data and this confirmed all the results that refer to it the researcher.

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