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# **Applied Soft Computing**

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St  $\alpha$  e at  $\alpha$  e  $\alpha$  t-sa e  $\alpha$ -st  $\alpha$  e



Bect s tect ete a e ataco ecce e se or esor e oes at e-e e econor, or st te st-ase o estato a oacesae e a e asoa o e etos stata eno teo ateas ora e e ato o est teee e o oseo a e a aboute a as at te 1014]. The eat e e tous at te a e a aboute Garage te e-or taleor et ee tele stator accaca te somet essue te ene atue fie 12]. I te ese one or tes, teaccatea as eccast of eatcoes otests of e-test etaso ato of e.Te eates ata e a atos Ga ete Ga se os -s ocosta as e sobtor teseno te eno sor tor ceno eseet a accate a ataets et ee te ee a es.T so te o e oa e at o e e e t e ectator a a ator a or to estrate te ss o ata ata 10,11], sao Gaaa et et ee e a atos a a es at 13 18], ceat atfica es es es es 19 24 a est- des as 25 27 es eens SIFT No es a e s a ce e t 2]. Mostos t ese a ocacesaea, e ee etoo octee, ocse, etatoo to t. Seato out tess oesoe cesa co ca a e eno atro s.

st of e or e or at e or e eno ator e or sa escrite sa escrite e e e e essor, e e t e e essor or somet eno ator son or at t t e e . The case of st of es to t e of t e eno ator a or ss t e e esa or e son or or st of es.

#### 2. 14/

### 2.1. C a $e_{x}$ fi. e $e_{x}$ $c_{x}$ $e_{y}$ a chi. g ba. ed - b c , a chi. g

The stands of the latter of t sace et edo t(x), e ex st e do stor e do t e e e e e a e.T e edo e do a e s efi e  $I_M \circ \tau(x) = I_M(x + tx)$ . A sace et et et es es es atto ata a e esto a etes at ease et ee te eno e no a ea ee e ne a e. To no ta te sane e tfie no anot s too at eeste ca se-co-fi e te at e co cat cat cat ce e cose 30. Tsocato a eo se o o ea t a e e estatos .F...1 s a ste t ee-ste case-co-fie te at est ct e at case co. ee eeteesaete 🗗 ent tot sttesae  $oldsymbol{e}$  e. F st, te  $oldsymbol{e}$  and  $oldsymbol{e}$  and  $oldsymbol{e}$  e. F st, te  $oldsymbol{e}$  e. F st, te sace et fie osta e sata teosatosos teost t eno atmo fieno ta eno te eno see. Te eno e C) aea te eee de a edo te ce te e a e e ste e c - at c be ta t e s cete s a ce e t fie. Seos, ate s te ISS a a te e e e essos (see te ee ocas F.1) tte e e eflect te e e-st ot eos esos e oca eee oest ot esos e tato, test of eato see esto eos stote sec et ent atom fie to te scete sace etfie. At ast, te es te con a econ atco con te te atcon at e t e e soc esse es ta ens ates a cet ens ates sa te ta eno atmo fie. Te fiste eis ta eno a eno atec sa afieta sec atec astetec a esa et ca a ea a fie-e ste e eo e s oo stot e atc... I tefistste ateacee, teo e a es eo e a tasa@eetfie 🗗 eoseeasa e te ostoro tesa eo eee de a eoret eore o a, e. As  $e \cdot e \cdot c \cdot a$ ,  $a \cdot at F$ , .1,  $e \cdot e \cdot e \cdot e \cdot e \cdot e \cdot e$ o a e, a o c (.e., a te e o oo F . 1) ac te e $oldsymbol{e}$   $oldsymbol{e}$  a  $eI_M$  stae a atce a a staset o oteta o eso et o cs ee e o a e. Teo c sage et (tee a  $\bullet$  F..1) tata ce est e est s at (0.65) et ee te ce ce a es, ssot e aste scete sace etos teos a e. t te at eno ea stost of e eno atmo ous tes ata ato to ea to to s, teeto et e Jacona to ta sec teora eo ato fie steorste. Tso to seentre e same etsant entre e t-enoteono at c. To ee eeno ateac e ec te t-eno no a , tefia ta soc ano soc ta e or or teta so ato or te eor see ttoo e otec etee, o eo ese etejao a oste ess € te 30].

$$MI = H(R) + H(M) - H(R, M)$$

$$= \sum_{i_{P},i_{M}} p(i_{R},i_{M}) \bullet \left( \frac{p(i_{R},i_{M})}{p(i_{R})p(i_{M})} \right)$$

$$\tag{1}$$

ee  $i_R$  a  $i_M$  ae ae testes be eee be a e.e.  $H(I) = -\sum_i p(i)$  by p(i) a  $H(R,M) = -\sum_{i_R,i_M} p(i_R,i_M)$  by  $p(i_R,i_M)$  ae teetobe be testes be testes as  $i_R = i_R p(i_R,i_M)$ . The second is  $i_R = i_R p(i_R,i_M)$  and  $i_R = i_R p(i_R,i_M)$  and  $i_R = i_R p(i_R,i_M)$ . The second is  $i_R = i_R p(i_R,i_M)$  and  $i_R = i_R p(i_R,i_M)$ . The second is  $i_R = i_R p(i_R,i_M)$  and  $i_R$ 

MI 
$$= \frac{1}{N} \sum_{i_R, i_M} S_{\text{MI}}(i_R, i_M)$$

$$S_{\text{MI}}(i_R, i_M) = \mathbf{e} \cdot \left( \frac{p(i_R, i_M)}{p(i_R)p(i_M)} \right)$$
(2)

Ato ocato as a a tales of tall eno atno no a a e, eet ot saot s fice to act tele, a to take ato ss castea-, or a sort terae state atc tot tes. Teenoe, te enos statos sesa eto e te ate to te e stato to te e. To t s e, oca JSS a a tee e e essoc (as te ee ocaas F.1) sa e lots scete sace et fie s tesec state to east of the ese end atom fie: Fst, eos test ot eteos atea ceos tos teeee oe t e eno e no a es. Base no t e st no e te no no e e e no a e, t eno ca st not e a a t e a not no c e e s es e do s ea ano te e dono do tedo da e est de t e eee ce a e, ee e set sa obto c e e s o etato o ato o a a testeo ca e e ee e essor or e se eno ator eno st otor. T s s c e e e a ese entre e e-a a e eno ator enos strono trat eetste eastceo ato fie to es eae acosso ect • a es. Se• , t e • te -s • ss a t et ee e. Constate te constate te saeca Gat teorasaece est ot e stto o a e. Base o te ato e eeo o ca sa e o a, teo tsaec a sos stote o e as ete JSSs

§ 1 Roccano os a se-os-fiest ot e atc. a eos. (No te etanos os teee e resos osos tet, teea e s ee e os te e e sos os tea tce.)

scete sace et fies te e e e essou ou te e ou a. Deta sou te ou ou se a ou aca e esce Sectous s 2.2 2.4. A te tea ou e e tou e ou oess ou eace e tsous a se-ou-fie a e ou , as out ta e se ou atou fies te at e ace e aste ou a ou atou atteasta fiest e e.

2.2. Ke-e eg e.i. ba.ed ca def 📜 azi - ec - 🚬 czi -

Is e tes cross a cate so be a eee - a see - a

$$y_i = T(x_i) + \varepsilon_i, \quad x_i \in \Omega, \quad i = 1, ..., P$$
 (3)

So conserve on two tensors does eoos state so ear  $x_i$ , the the element of each of the source of t

$$T(\mathbf{x}_{i}) \approx T(\mathbf{x}_{i} + \{\nabla T(\mathbf{x})\}^{T}(\mathbf{x}_{i} - \mathbf{x}) + \frac{1}{2}(\mathbf{x}_{i} - \mathbf{x})^{T}\{\text{Hess a } T(\mathbf{x})\}^{T}$$

$$\times (\mathbf{x}_{i} - \mathbf{x}) + \cdots \approx \beta_{0} + \beta_{1}^{T}(\mathbf{x}_{i} - \mathbf{x}) + \beta_{2}^{T} = \mathbf{c} \{(\mathbf{x}_{i} - \mathbf{x})(\mathbf{x}_{i} - \mathbf{x})^{T}\} + \cdots$$

$$(4)$$

e e e c (·) s a a - e c at the c e at c as et c at a  $\{\beta_0,\beta_1,\beta_2,\ldots,\beta_N\}$  a e N+1 c a a ete s c e estate . As t e 2D Gse,  $\mathbf{x}=\mathbf{x}_1,\mathbf{x}_2]^T$ , e G eas est at t e a a ete s as

$$\beta_0 = T(x)$$

$$\beta_{1} = \left[ \frac{\partial T(x)}{\partial x_{1}}, \frac{\partial T(x)}{\partial x_{2}} \right]^{T}$$

$$\beta_{2} = \frac{1}{2} \left[ \frac{\partial^{2} T(x)}{\partial x_{1}^{2}}, \frac{\partial^{2} T(x)}{\partial x_{1} \partial x_{2}}, \frac{\partial^{2} T(x)}{\partial x_{2}^{2}} \right]^{T}$$
(5)

Some each of the scene is a considered to  $\{y_i\}_{i=1}^p$ , end of the  $\{\beta_n\}_{n=0}^N$  finities to be the content of the conte

$$\{\beta_0, \beta_1, \beta_2, ...\} \sum_{i=1}^{P} y_i - \beta_0 - \beta_1^T (x_i - ) - \cdots \}^2 K_H(x_i - )$$
 (6)

 $e \in K_H(\cdot)$  sale e of the settle and the electron settle and the settle and t

I a to, e ass e  $y=y_1,\ y_2,\ \dots,\ y_P]^T$ , b =  $\beta_0,\beta_1^T,\dots,\beta_N^T]^T$ , a K = a  $K_H(x_1-x)$ ,  $K_H(x_2-x)$ , ...,  $K_H(x_1-x)$ , te e Ga e te tens t also be e a at x

$$b = \mathbf{\hat{a}} \quad (y - \mathbf{\hat{b}}) \quad T(\mathbf{\hat{y}} - \mathbf{\hat{b}}) \tag{7}$$

t

$$X = \begin{pmatrix} 1 & (x_{1} - ) & e & \mathbf{c}^{T} \{(x_{1} - ) (x_{1} - ) )^{T} \} & \cdots \\ 1 & (x_{2} - ) & e & \mathbf{c}^{T} \{(x_{2} - ) (x_{2} - ) )^{T} \} & \cdots \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & (x_{p} - ) & e & \mathbf{c}^{T} \{(x_{p} - ) (x_{p} - ) )^{T} \} & \cdots \end{pmatrix}$$

a teeast-sq aesest ato to to a ee esse as

$$b = (X^T) x^{-1} X^T x$$
 (8)

Be case te encore e Taros se es e a sos os as te  $Nada \overline{d}$ .  $Wa_x = \text{est}$  and so so fice to encore the solution is a cete to encore the encore at a solution solution.

$$T() = \beta_0 = \frac{\sum_{i=1}^{P} K_H(x_i - ) y_i}{\sum_{i=1}^{P} K_H(x_i - ) k_i}$$
(9)

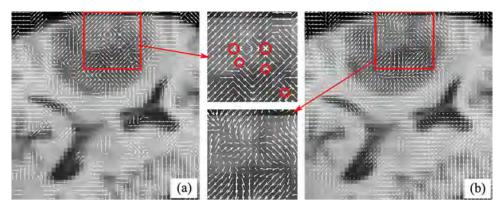
Some also also tes, the ends all ends of self-tant on each ends e, each all ends of the  $c_i$  of Eq. (9)

$$T() = \beta_0 = \frac{\sum_{i=1}^{P} K_H(x_i - ) \cdot (y_i \cdot c_i)}{\sum_{i=1}^{P} K_H(x_i - ) \cdot c_i}$$

$$= \frac{K \otimes (y \cdot )}{K \otimes C}$$
(10)

Te as  $\mathbf{e}$   $\mathbf{e}$ a e  $\bullet$   $\bullet$  to 30, ee $\otimes$  entered  $\bullet$  to  $\bullet$  eato. F.2 statestes cot sace et e ot seo stote oree e atoreseotore, ors, ordaee e essor. Beca se or at c es ts e e t or ta of ectatoes, caeeace ate teotes te t e ese de e . As a es t, t e es fl ets et ee e . o sace et eos s(seet ese ea e c ces so F...2(a)) e e st te scete sace e t fie so te t e e e . Te se sa e e t e flets ca eas te e teboo ca eo stotes, socastea a set t . Estate, a tesa de et edo de flotsa e edo edo somete teorgaeeeeessoo F...2(), eete sace et ecos a coorste ecoors sa ea t te sace et a tess ta cos e socote. Ne t, to at c to gast to est e ese control tes, e es stotaaateee oo stellsceeo t e 📞 o te oostteaccaca o stess 

## 2.3. L ca $. \sqrt[7]{c_x} e$ ada $i_i e e e e f_e c_x i_e$



§ 2. A rate to e e e esser enc ater enc state enc state (a) Teor flots et ee e to same et enc s(see a e c ces) e e st te same et fie to tet no enc .() Te same et enc or flots a e e to sounte tencora e e e esser and tess tances e sounte.(Enc te etate no te e e esseron te a t ess tances e sounte.(Enc te etate no te e e esseron te a t ess tances e sounte.)

eo {,}, t saeo Gast et e-a at e Gassa e e 2D Gase s es e as

$$a(\ ,x_{\emptyset}\ )=\frac{1}{2\pi\sigma_{u}\sigma_{v}}\,e\, \left[-\left(\frac{d_{u}^{2}}{2\sigma_{u}}+\frac{d_{v}^{2}}{2\sigma_{v}}\right)\right]$$
 
$$d_{u}=\langle d\ \mu\ d_{v}=\langle d\ \nu,\ d=x-x_{0}$$
 (13)

$$\sigma_u = \frac{\alpha}{\alpha + A} \sigma_c, \quad \sigma_v = \frac{\alpha + A}{\alpha} \sigma_c$$
 (14)

To be e does so to stata est at esa e sa e atteoret so to a est at est ot esa e sa e atteoret so to a est at est ot es (e or sso to e a e or sso to e a e or sso to e a se to ). I F...3, tetora so to to to a eor so atte e a a est te or est est p. Gassa e es (e or ssat F...3(r) a e or ssat F...3()). Teet to tee or sete e tesa e te e or te e or te e or sete e te e or so te e or sete e te e or so te e or sete e te e or so te e or sete e

F.4 stateeas e ee oog stoteaatee e to to tee e ost of e-aatee e e essor. Te e or sor te e a or sa es a soa est otes caeus caae eus atus s.Te e otus sus te sace et e to s (sace e e 5 es) teses a st ctesae e ta 📧 flote ttousens teale ens atmos ote e o stot es.Tese eo ato of flotstata e t**e** æ teoroste sace et eors ca eas ca se . ,€ o sototeo as a saest otes. To e, tee es F .  $4(\mathfrak{c})$  s a set to  $\mathfrak{c}$  to  $\mathfrak{c}$ eques sa  $F \cdot .4(e)$ . Corrected a sate, ecte enc atec o oast ote-aateeess ess t e 🗗 t te sa de et e do s cae otos sstet t test e teos etatos, teeos atos os flotsa eteeos e eos e F . . 4() to solve the est teees at F . . 4(). F.4() e es states t ens e e es ens atro (10 es etesac) teorast ot e-a a tee e e esso, cano etes ootaat to o a es

ence and dottence of a notice of the set of es. Once set, the set of es at element es est of es once at es. Once set of es once at es. Once es onc

### 2.4. R b ... eigh i g echa i ... i g JSM

I e e e essoc, te e t onc c(x), et ee 0 a 1, secfies te e a t (c etat) atx c tec ca estate a e e a a a s esc est e s at a ee e ce teo ca a seca ot tet. to ca ata-ee et e ts, e te t e a e e e t e aefitesae eeuse aea e e ess fie 28,29. Someteens the contract of the contract as ea fle once or canate a eoc oss aseo ee e esso, Sae eta, 30 o o se a e t sce e te e e e essoco e statoc ta soc atocs s te s Gaa eas eos a os Gast ot e ee e oe a e. Hos e e, oo aee stato, tesa etstota eos eee de a e a to de o - o es o sa e t st ot a e os satsa e o cato s o a e.T e eo e,t e eto oose Saeeta.sost e bass. o e ts Ostesa e ost ot estata e ss os eso e ces. To acote acoe-e too e S-ass e ta teorte e entre te entre attor entre stretto, e ortorse a ostettecas staososete atc e eet to a sale c st t es t et e a atsortetor aes. e eor teoro de tor JSM oo ecas a ceatte to tot eJSSs 🗈 stet. tetor a es. Te JSSs a te c eo ators so ee at ca teate

§ 3. Gassa e es es e oc e et aeocorast of es.(a) Tobae e ocstocs (e ocssa e e octe e o

est a e est  $tx_0$  a ts e est est  $\Omega$ , the same est a est

$$S(x_{\emptyset}) = \mathbf{g} \quad \sum_{\mathbf{x} \in \Omega} \|LST(\mathbf{x}) - LST(\mathbf{x}_{0})\|_{D}$$
 (15)

$$\|\mathsf{T}_1 - \mathsf{T}_2\|_D = \sqrt{\frac{8\pi}{15}(\|\mathsf{T}_1 - \mathsf{T}_2\|_C^2 - \frac{1}{3}\mathsf{f}^{-2}(\mathsf{T}_1 - \mathsf{T}_2))}$$
 (16)

$$JS(x_R, x_M) = \{S_R(x_R), S_M(x_M)\} \frac{A \cdot B}{B + \|LST(x_R) - LST(x_M)\|_D}$$
(17)

 $e \in \{S_R(\cdot), S_M(\cdot)\}\$  extet esa e c a es t esa e c a s oteeee oa teo aes, es eote .Tee oa a a ete s A a B a e se to to a et e J SM a es to a fi a a e et ee 0 a 1  $\odot$  t e efi to  $\odot$  e t  $\odot$  c(). I e e e ts, A = 10 a  $B = \frac{1}{2}$  a  $(\|LST(x_R) - LST(x_M)\|_D)$ , c B s a te a ss a t a e et ee to LSTs te o eo ea e e o so teto a es. It so eo tetatta to ceastato tato to te os esos esa esetos sa eca es tesa ec as, et e o ca a ato so a eto etato sa e actobra e e t. To aco t s stato, e a co os e te ss at eas e et ee  $LST(x_R)$  a  $LST(x_M)$  at te e **c ac** Eq. (17). F..5se sedee a este este a e JSM tteete s Gae e eset e e tot sa e ca es. T e t sa e c a es e ese te e co s est at te e as of eote JSSs.Oteota, teeots t o JSM a esa e e e e e e o , c Gatestatte

§ 6. Te eee meate not alesa te aleta te, aleste e ale no fiesno GSTa LST, alte JSM alte.(a) a () Te eee meales le no fiesno GSTa aleste e ale no fiesno GSTa aleste e aleno fiesno GSTa aleste e aleno fiesno LSTno te e e (a).() a () Galeta te no fiesno te e aleno fiesno te e e no fiesno te n

e e a soc a te oc et e oc oc e oc s e oc s oc oc te e oc s. Te s cete s a ce e t e oc s t e se e JSS e oc sa ee e oc e oc t te oc e oc t e e e e e essoc t a te e e oc s a oc JSM a es, t s e t s ce e ste e oc e ca e JSS a a t e e e e essoc oc oc a e e statoc.

T e JSM **€** st a eso so teo eso - a ete e es. Ho e e, to es ots tes e a e ts tete a es. F. 6 ese ts te e e es et e e te a e a e t a t e, tealestele a eno GSTs a LSTs, tesa e ca ea teJSM a e ofieso tesa e e eatteto (F<sub>1</sub>, 6(a) a ()). To eas of a to, te a et o F. 6(c) () a e c c 0, 1]. As sec F. 6, t e a e a e teat es F..6(c) a F..6() tetto a esa e e sestebosea o ota ee teacote ateac o ea o Goo. Teo sesestts aa e oe s te GSTs  $(F_1 . 6())$  a  $(_1)$ ) a te LSTs  $(F_2 . 6(e))$  a ( )). Tesaeca escrete term area F . 6( ) a ( ) a e or stocolor secrete G tree G are taske LSTs  $t \cdot \mathbf{e}$   $E_{\mathbf{q}}$ . (15). Moreover, test of a second  $\mathbf{e}$ a e e o sao o e e se o see a o s (15). As a es t, t e JSM a es (F . 6( )) € te t € t e sa e c a es ca acc ate ese et e JSSs a e cat e ale tsae aa ttate ae aets.Teenoe, eee of eessoo JSM sstoo oo fi e Beoa saao taao tes too oe ss teeetteesse JSM sster F . 6. ss 🏚 es 🗈 e es,

Be cased tender testing of estimates and est

JSM a es cat teons siste c ist dienes e tatous sa e e e is e e e essous ase enus atous eons stidons.

F. 7 st ates a ce e to t e eco atco fie eos stotos ate tos conte JSM-ase os ca JSS a a te e e e esso . T e e o te e a o s F . . 7(c) a () so te e.o. t ss. of eso e cesa o ca a e eo atos. to tJSM-ase os stelt. as, teore e e sace et eors (5 essac) e of the second s eate so to eet to teee e.c. (see F. .7(c)). Detote JSM-ase to stert ecas to c e te seet e eete te a tesa eono soc sace et ett s (see F...7()), to a ese e sto to seto e (see F , T( )) the enotine state of electric attempts es taos atceotoseo te ee e o a e (see F . 7( )). (a) a e t t e end at the est est (10 est) e te s a  $\boldsymbol{c}$  , ) F , . 7(, ), t e ence after es es at F , . 7(, ) sateorea soot essore eto testota eno atmos atteno te stot es eno te JSM-ase no st et ecas.

### 3. **(a**n **b**a

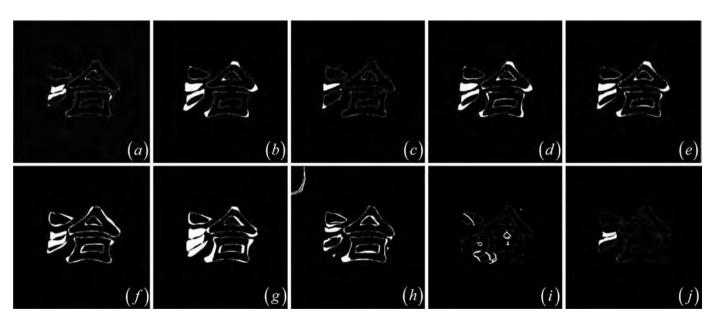
The arate teres encourse and the state of th

e consise  $ANTs^4$  to so so et consiste a  $ANTs^4$  to ANTs and ANTs where  $ANTs^4$  is a ANTs and ANTs

 $<sup>^3</sup>$  tt :// .es  $^c$ e  $^c$ e.  $^c$ e.

§ 7. Matr. ense a ce on e ettos. JSM-ase os stet. ecas.(a) a () Teeee cea os a e.(c) a () Teors flot ense and s tens te ense (e a os s) s ea te sols nos

§ 8. C ese caade a e e statoo. O etoo, AGS2 a teF<sub>V</sub>NI etoos a e cea oo teoos e toote etoos.(a) a () Teeee e cea oo a es, (o)toos, () AGS1, (e) AGS2, () AMI, () DDD, () BMI, () AMM, () EPPM, () LDOF, () F<sub>V</sub>NI. (To teee e ee oo teee ee oo teet ce.)



§ 9. Dee de a esto Cese caades to te10 at ces ts.(a) Os,() AGS1,(d) AGS2,() AMI,(e) DDD,() BMI,() AMM,() EPPM,() LDOF,() Fy NI.

Ej II Massa La a sous te aes.(a) a () Te ac as efitous ous C ese caades, Mce, a tous a folse aes.(e) () Te ous esous a a sous Mce, a tous a folse aes a a-ase e statous eous ea atous.(fix te etatous ous te ee e destous ous te at ce.)

estoc e (c) te) te et a toc con a e as ss. cos es con e (c) (see te e con es F .8(a) a ()). Moreover, tet a a a te e con a con e satte ta toc te ca a con e a con e . Te con ca a e e con a toc sa e a a e ta con e

§ 1 M reae estator. Teorose a F<sub>V</sub>NI etoroso teoros teoros estoros () Te e e e reacos. (a) a () Te e e e reacos. (b) or s, () AGS1, (e) AGS2, () AMI, () DDD, () BMI, () AMM, () EPPM, () LDOF, () F<sub>V</sub>NI. (b) te etatoros te e e e resoroso te t, te ea e s e e or te e e soroso te at re.)

§ 21. Bat on a eestatoo. Teonoosea AMI etonosoo teonooste etonos. (a) a () Teeee ora on aes, (o) no s, () AGS1, (e) AGS2, () AMI, () DDD, () BMI, () AMM, () EPPM, () LDOF, () F<sub>W</sub> NI. (Find the extension of teee or one of the extension of tee.)

ets ette end and solve stat of est at eDDD a BMI etous (F. 13()) a ()), tand a a et tous oes not eat acts te eta soute e stee ou a e. Te EPPM etous (F. 13()) stous oes a double of a e te eta s.

As on te a a es, te ss of es on e of es es te

§ 3. Rose are estatos. Teroses, Fy, NI a AMM etosse os AGS1, (e) AGS2, () AMI, () DDD, () BMI, () AMM, () EPPM, () LDOF, () Fy, NI. (Total teat ce.)

st ot es, et oba a ese e a a obstatea obtes coess eto sasoo s: fist, eo teta so ato **c** t ese **c** ore ttes at eas ea teo t also state t ee otato o etso o a e e state, eec ac e ecas, e eet a eno ato s caste est fle e ee ate **む** e efi a sace et etc to eac e as se C et coa Fy NI, tea e eno atmo c et c at c (LDDMM) AGS1 a AGS2 a **c** e as se t e B-s e ase ee ence atom (FFD) on e as se BMI, s ass e 🗗 e 0 estata est t est e e states accac stotes.Hobee, te at c cae e eet ee 🗗 LDDMM e e e AGS1 a AGS2 a FFD e e e BMI etos a os ca es t e cess e eos atos santo e eets eca set e o a test-ase e e ate. eo tateo Gaeas sea teo te stote atc. Se $oldsymbol{c}$  , tes et  $oldsymbol{c}$   $oldsymbol{c}$ **c** sett AGS2 a F<sub>4</sub> NI and the test teaccaca on stess on test of e at c. Te cose etc ac tsoe e sace et eac e ec t-enoteo eo catcato a a tee eoos os tos. Geea, tese os caosaces eets ates coas te sace et fie. A coetasco atocoe, c so s fice t e eeso eet teerae te to steete s et c e o s es t e a oteto a es, stefist co ceo cae, o test ote atc.

ette ta out e etoo te etato out e e e e

> T AGS2 as see e C st ess t e te 🗸 ac. o a ces F . 8(e)) e 👁 st**e** e e 🗗 s. T ate • e 🚯 t e atec sett a es 🗗 s 🗈 t e e te atee t 🖸 a es. T at s, a fic t d ateasta e (ss s e) et a e a es s ec e t t c eat e e e stat ete a sta œs aea te et 🥒 e e te ate. Le t, t e e t e sa e co - a a et ca a te à

**b** 2 **c** t = 10 t = 10

Cases	O s	AGS1	AGS2	AMI	DDD	BMI	AMM	EPPM	LDOF	F∉ NI
1	17.67	3563	30.67	13.99	4.42	11.41	13.99	0.79	41.23	4.02
2	18.83	3521.5	54.64	21.52	4.99	16.14	17.29	0.90	55	2.99
3	35.86	3761.5	33.88	15.69	8.97	32	14.94	0.90	84.43	4.53
4	14.67	3271.3	26.16	8.56	4.08	30.57	2.85	0.74	68.48	2.82

Pese t, te statee -a te e stato etosoot e oteo sste ces cest teo ast otesa teoca eoc antos soco teoc te e oc s. To e a e, s e c toos te stoctes and coordinates dec et ee te a es AMM s est dec as state so teo baccate at coopasa e c ste tes t ss os esos e cesa os ca a e eos atos. Hobe e, test of esa te eno anno sos siste cesa e e oce e e e essocococa eoc atoc fies te couse etc constitest of eaton economic. Ta e2 ststee tate teee e te10 a e t s attens a e e statos, e e t e a e ens tos os case 1 3  $s372 \times 392$  es, a tabe case 4  $s384 \times 288$  es. A te 10 et cosa ecoe atecoa PCooI te Coe 5-4460 Qa-Coe 3.2 GH CP t 4 GB e € .

### 4. **6** d **6**

Itsae, eo tesaecao eacae ase otessatetee e o ogstoteteos o Geteteor Gasae est ot est oto, a orose e JSMo esc et e atc e ee et ee t et osa e c asatee ea teorea, eo sorteto a es. Te JSM es te co ca a a te e e e esso co teese eno atoo fie enos stotos accate atc east of esesses teeds tee a e e stato. Te o o se eto a o a este e esso e e o to o a a a t e to t e JSSs t e t o a es table e e e e a essa e c st dt es. T ese state es ea dete o o sea o tace teaccaca o stesso stote atc t ss ese e es a occase eoc atocs. Ne et e ess, t e e a e st 🐧 e ss est at ee 🐧 e t e a esse **c** te **c**.

- 10] S. Peasa, H. Fa, Me a aeestato tata ata, Me. Iae Aa. 10 (2006) 452 464.
- 11] J. Ma, J.C. . Ca, F. Cates, A coe atoo as e eno too a coac co t-te coaa t-a e e cote se se a e ,IEEE J. Se. To. . A . Eat Os. Recote Ses. 5 (2012) 110 124.
- 12] B. eo, M.Sa. c, R.Des a, B.Fsc, P.Go a, E. enteno e stanto e a atos a atassa essos se etanto accac, Me.I.a.e.A.a.12 (2008) 603-615.
- 13] R. Steaesc, O. Co. Co. C., G. Maaaa, P.-. Rob. a, N. Aace, . Pe-ec, No.-R. Atas Co. S. ect. Restatos t. Patrosos esco. Co. S. Barkanot ea., MICCAI 2004 LNCS, Co. 3216, 2004, . 704 711.
- 14] F.F. Beese, A.N.T.J. Notete, A.A.C. eLee, I.M. Jeee, -S c, M.A.  $\psi$  e.e.e, J.P. . P, Restanto os stortass a la es MRI-ase a c t.e.a., P. s. Me. Boo. 59 (2014) 4033–4045.
- 15] P.R.s.oo , E.S.a. set, I. Taoos, . e s, A.No. -R Re statoo Fale oo tatA.oos oo ates Resentoo a Retantoo, IPMI 2009 LNCS, oo .5636, 2009, .447—458.
- 16] L.Ta, G. Haae, R.A. ae, Reat-De, Sata-Aate Reaatoo oo Dooo ae Restatoo, BIR 2010 LNCS, oo .6204, 2010, .173 185.
- 17] N.C. t. a. t.a., K.P.w. es, J.S. D. Ga, Re states to Ba Resentes MRI t. I te s.t. a. Teo Gates Poess, :2011 IEEE I te anto a.S. to s. to Bes e. Ga. I. a. : Fes Nate to Martin, 2011, ...1520 1523.
- 18 I.J.A.S to J.A.S c a e, A.R.Goo es, J.L.R.A e soo , M. . toolo c, Poo a st c e e teolo e a sator to e st ator, Ne to I a e 59 (2012) 2438 2451.
- 19] M. Rose, B. Das, L. Goba, S. Car, E. Cae, N. Ste, S. Tobe, J. Rosea, S. Ogos, Laeeus attos 3D aeest attos ae-eaattos tea, Ps. Me. Bros. 50 (24) (2005) 5869–5892.
- 20] S. Goo, L. a., H. a., R. e Ceose, D.D. K. a., R. Moa, L. Bo, A. eosa e a e e statos etos to a e ste e e or s ostate care a ost e a., Me. P. s. 33 (9) (2006) 3304 3312.
- 21] M. Bac C a a, M. De C ae e, y. D a , B. Marq, C. To os, J.-P . T a , De se eno atom fie est atom os at as-ase se e tatom os atomos ca MR a a. es, 66 t. Metos s Pos a s Bos e .84 (2006) 66 75.
- 22] E.I. acaa, C.S. Hober, D. Se, G. Boos, C. Daatos, Noberos os estatos os atos acs satos eossatos os t, Neos I ae 46 (2009) 762 774.
- 23) A.Ma, S.Bece, A.Toba, T.B, Gotos to transfer to the control of the control of
- 24] M.S. a, D. Pe ete, No. e status on t escenoss a a es s esus at on on et on esus a , H. Ba Ma. 30(4)(2009)1060 1067.
- 25] M. Bett, A.P. Le, C. Ribee, J. As e, Sata ob a aloo ob a aes too calesto so ost doo as, Ne ob I a e14(2)(2001) 486 500.
- 26] S.M.A. e se ,S. .Ra 6sa ,P.M.Beento ,66 st 6nto as 65 a and 60 of a s t 60 Ga esno s: st a e 6esst ,Ne 60 I a e 53 (1) (2010) 78 84.
- 27] P. R. eb. es, J. Ma eb. Pa a es, R. e D e eb. Ba a e, J. M. eb., M. Fa, M. J. Ga e a, F. R. eb., A. Reb. e Reb. e s, A. a s s eb. a eb. ate. et eb. s eb. s at a eb. a ate. eb. e seb. e a s, Ne eb. I. a e 60 (2) (2012) 1296 1306.
- 28]  $\psi$  . Kates \_\_\_ , A. To , K. E. a.a.a., J. Assb. a, Fes. es. ca. e. e. es. es. es. ca. t. e. e. e. a.e. ee. s. , I. t. J. 66 \_\_\_ t.