R version 4.3.0 (2023-04-21 ucrt) -- "Already Tomorrow"

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Platform: x86\_64-w64-mingw32/x64 (64-bit)

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[Workspace loaded from ~/.RData]

> library(mgcv)

Loading required package: nlme

This is mgcv 1.8-42. For overview type 'help("mgcv-package")'.

> library(mgcv)

> data1=read.table("F:\\4. me\\kelautan\\HAHAHIHI\\GAM\\GAM.txt", header=T)

> data1

SST SSH CHL ARUS FISHING

1 30.46100 0.187557408 1.4678059 0.14171143 11017.047

2 30.39904 0.165546557 1.1030295 0.09799456 11017.047

3 29.80367 0.074633661 0.1417960 0.17981344 11017.047

4 29.90910 0.084490497 0.1536726 0.21334969 11017.047

5 29.75543 0.079008804 0.1441464 0.19505181 11017.047

6 27.04872 0.021211052 0.5345674 0.13884473 11017.047

7 27.30189 0.024901071 0.3371886 0.13555354 11017.047

8 27.11133 0.022004628 0.5497383 0.12915358 11017.047

9 28.80113 0.025770064 0.2510409 0.20178645 11017.047

10 28.98564 0.040928126 0.1904094 0.21664712 11017.047

11 28.82520 0.026557474 0.2102220 0.20572911 11017.047

12 30.41132 0.119129204 0.1426171 0.12693290 11017.047

13 30.32004 0.146517833 0.1398730 0.10062432 6051.979

14 30.41477 0.147102000 0.1436513 0.14442464 6051.979

15 30.22891 0.166094286 1.1763017 0.10440814 6051.979

16 30.13432 0.156496125 0.1965663 0.07169973 6840.167

17 30.10469 0.160740963 0.2599623 0.12954891 6840.167

18 29.61223 0.100570332 0.4978103 0.13858787 6840.167

19 29.89783 0.099983875 0.3844738 0.15026142 6840.167

20 29.88207 0.093130468 0.3100430 0.14924781 6840.167

21 26.91341 0.028321656 0.4158812 0.17165801 6840.167

22 27.18474 0.024829931 0.4684784 0.17779954 6840.167

23 27.07050 0.023048508 0.5343683 0.17527077 6840.167

24 28.88950 0.006682814 0.2088853 0.16293571 6840.167

25 28.78520 0.005784720 0.3156087 0.18601545 6840.167

26 28.80151 0.011835007 0.3265036 0.12480500 6840.167

27 30.32905 0.149812652 0.4446435 0.09696999 6840.167

28 30.38294 0.148190567 0.4308111 0.12543125 9970.833

29 30.31163 0.167239439 0.6354658 0.13253053 9970.833

30 29.92886 0.103471616 0.3196915 0.12602196 9970.833

31 29.86564 0.102514148 0.3508591 0.13675910 9970.833

32 29.89102 0.096660509 0.2620320 0.19155677 9970.833

33 27.45094 0.039260783 0.2959781 0.21117742 9970.833

34 27.46182 0.039522562 0.2960609 0.19012578 9970.833

35 27.04273 0.036852136 0.7242380 0.19380107 9970.833

36 28.68303 0.008428357 0.4274484 0.19478407 9970.833

37 28.42800 0.008540949 0.4763264 0.16984900 9970.833

38 28.11154 0.007122498 0.6709806 0.14499451 9970.833

39 30.31990 0.162960016 0.5182825 0.10948318 9970.833

40 30.41740 0.174148875 0.5632041 0.12159239 8049.667

41 30.40518 0.168816567 0.4499383 0.12426112 8049.667

42 29.89022 0.105891779 0.3727411 0.14037382 8049.667

43 29.85724 0.103646509 0.3506232 0.12746237 8049.667

44 29.85149 0.095347866 0.2934139 0.20795003 8049.667

45 27.27656 0.030405023 0.3950399 0.20553394 8049.667

46 27.19320 0.030879455 0.5368347 0.19807237 8049.667

47 26.91868 0.032180638 0.9192456 0.18088530 8049.667

48 28.47018 0.009858186 0.5303717 0.19159252 8049.667

49 28.17609 0.006962429 0.7233815 0.14464002 8049.667

50 28.15352 0.007352301 0.9123978 0.11145086 8049.667

51 30.40785 0.175643989 0.6361525 0.15085926 8049.667

> attach(data1)

> names(data1)

[1] "SST" "SSH" "CHL" "ARUS" "FISHING"

> model1<-gam(FISHING~(s(SST)+s(CHL)+s(SSH)+s(ARUS)), family=gaussian, data=data1)

> summary(model1)

Family: gaussian

Link function: identity

Formula:

FISHING ~ (s(SST) + s(CHL) + s(SSH) + s(ARUS))

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 202.2 43.51 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(SST) 2.676 3.325 2.155 0.1063

s(CHL) 1.000 1.000 1.223 0.2759

s(SSH) 4.016 4.974 2.199 0.0792 .

s(ARUS) 5.109 6.132 1.260 0.2961

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.309 Deviance explained = 48.6%

GCV = 2.8585e+06 Scale est. = 2.0849e+06 n = 51

> AIC(model1)

[1] 900.304

> BIC(model1)

[1] 928.8981

> plot(model1)

Hit <Return> to see next plot:

Hit <Return> to see next plot:

Hit <Return> to see next plot:

> model2<-gam(FISHING~s(SST), family=gaussian, data=data1)

> summary(model2)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(SST)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 245.1 35.89 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(SST) 1 1 0.245 0.623

R-sq.(adj) = -0.0153 Deviance explained = 0.497%

GCV = 3.1901e+06 Scale est. = 3.065e+06 n = 51

> AIC(model2)

[1] 910.4049

> BIC(model2)

[1] 916.2004

> plot(model2)

> model3<-gam(FISHING~s(CHL), family=gaussian, data=data1)

> summary(model3)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(CHL)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 245.4 35.85 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(CHL) 1.122 1.233 0.054 0.947

R-sq.(adj) = -0.0173 Deviance explained = 0.553%

GCV = 3.2042e+06 Scale est. = 3.0709e+06 n = 51

> AIC(model3)

[1] 910.6201

> BIC(model3)

[1] 916.651

> plot(model3)

> model4<-gam(FISHING~s(SSH), family=gaussian, data=data1)

> summary(model4)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(SSH)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8798 231 38.08 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(SSH) 3.558 4.374 1.572 0.198

R-sq.(adj) = 0.0984 Deviance explained = 16.3%

GCV = 2.9888e+06 Scale est. = 2.7216e+06 n = 51

> AIC(model4)

[1] 906.7271

> BIC(model4)

[1] 917.4647

> plot(model4)

> model5<-gam(FISHING~s(ARUS), family=gaussian, data=data1)

> summary(model5)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(ARUS)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 227.1 38.74 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(ARUS) 3.288 4.112 2.049 0.101

R-sq.(adj) = 0.129 Deviance explained = 18.6%

GCV = 2.8723e+06 Scale est. = 2.6308e+06 n = 51

> AIC(model5)

[1] 904.7508

> BIC(model5)

[1] 914.9669

> plot(model5)

> model6<-gam(FISHING~s(CHL)+s(SST), family=gaussian, data=data1)

> summary(model6)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(CHL) + s(SST)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 245.4 35.85 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(CHL) 1.521 1.884 0.391 0.677

s(SST) 1.000 1.000 0.506 0.481

R-sq.(adj) = -0.0172 Deviance explained = 3.41%

GCV = 3.2982e+06 Scale est. = 3.0705e+06 n = 51

> AIC(model6)

[1] 911.9301

> BIC(model6)

[1] 920.663

> plot(model6)

Hit <Return> to see next plot:

> model7<-gam(FISHING~s(CHL)+s(ARUS), family=gaussian, data=data1)

> summary(model7)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(CHL) + s(ARUS)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 226.5 38.84 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(CHL) 1.035 1.069 0.846 0.3833

s(ARUS) 3.507 4.365 2.242 0.0735 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.133 Deviance explained = 21.2%

GCV = 2.935e+06 Scale est. = 2.6161e+06 n = 51

> AIC(model7)

[1] 905.5849

> BIC(model7)

[1] 918.2227

> plot(model7)

Hit <Return> to see next plot:

> model8<-gam(FISHING~s(CHL)+s(SSH), family=gaussian, data=data1)

> summary(model8)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(CHL) + s(SSH)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 233.5 37.67 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(CHL) 1.000 1.000 0.053 0.820

s(SSH) 3.444 4.258 1.526 0.201

R-sq.(adj) = 0.0786 Deviance explained = 16.1%

GCV = 3.1137e+06 Scale est. = 2.7813e+06 n = 51

> AIC(model8)

[1] 908.6231

> BIC(model8)

[1] 921.0718

> plot(model8)

Hit <Return> to see next plot:

> model9<-gam(FISHING~s(SST)+s(ARUS), family=gaussian, data=data1)

> summary(model9)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(SST) + s(ARUS)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 229.6 38.32 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(SST) 1.000 1.000 0.003 0.953

s(ARUS) 3.251 4.073 1.948 0.117

R-sq.(adj) = 0.109 Deviance explained = 18.5%

GCV = 2.9971e+06 Scale est. = 2.6885e+06 n = 51

> AIC(model9)

[1] 906.7213

> BIC(model9)

[1] 918.7973

> plot(model9)

Hit <Return> to see next plot:

> model10<-gam(FISHING~s(SST)+s(SSH), family=gaussian, data=data1)

> summary(model10)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(SST) + s(SSH)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 214.6 41 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(SST) 2.764 3.454 1.771 0.1392

s(SSH) 4.245 5.139 2.938 0.0225 \*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.222 Deviance explained = 33.1%

GCV = 2.7858e+06 Scale est. = 2.3483e+06 n = 51

> AIC(model10)

[1] 902.1673

> BIC(model10)

[1] 919.5715

> plot(model10)

Hit <Return> to see next plot:

> model11<-gam(FISHING~s(ARUS)+s(SSH), family=gaussian, data=data1)

> summary(model11)

Family: gaussian

Link function: identity

Formula:

FISHING ~ s(ARUS) + s(SSH)

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 8797.8 212.7 41.36 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(ARUS) 3.316 4.147 1.230 0.314

s(SSH) 7.382 8.266 1.463 0.294

R-sq.(adj) = 0.236 Deviance explained = 39.9%

GCV = 2.9942e+06 Scale est. = 2.3074e+06 n = 51

> AIC(model11)

[1]

> BIC(model11)

[1] 928.6037

> plot(model11)