**Approach 1: Single Trail EEG Classification – 70 features**

Theta:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.50521079 0.50497686 0.50430402 0.50181098 0.50158499]** | **4, 49, 50, 54, 53** | **[0.52196594 0.52015112 0.51970376 0.51969735 0.51857125]** | **15, 6, 14, 3, 41** | **[0.53667823 0.53057117 0.52536063 0.52512875 0.52446078]** | **15, 11, 22, 13, 23]** |
| **2** | **[0.5063415 0.50226757 0.50181329 0.49863946 0.49796431]** | **15, 25, 34, 42, 27** | **[0.52423197 0.52264442 0.52083395 0.51630343 0.51562546]** | **13, 17, 37, 6, 51** | **[0.52785086 0.52672092 0.52649519 0.52445796 0.52422967]** | **23, 15, 25, 34, 14** |
| **3** | **[0.50430454 0.50385025 0.50339674 0.50226885 0.50090908]** | **19, 55, 22, 58, 46** | **[0.52083933 0.51902195 0.51834193 0.5172143 0.51653531]** | **6, 22, 41, 14,3** | **0.52898746 0.52649698 0.52490917 0.52309973 0.52287348]** | **23, 11, 19, 39, 48** |

Alpha:

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| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.51766602 0.51517195 0.50091215 0.50067386 0.49977427]** | **[49, 42, 14, 17, 18])** | **[0.5228699 0.52263981 0.52151243 0.51788535 0.5129031 ]** | **[19, 47, 42, 29, 26** | **[0.51902195 0.5181162 0.51765936 0.5158494 0.51426364]** | **1, 23, 52, 54, 21** |
| **2** | **[0.50838283 0.50815428 0.50814966 0.50430556 0.50293913]** | **30, 49, 42, 18, 9** | **[0.52445258 0.5140397 0.51358593 0.51358363 0.51290361** | **38, 45, 32, 4, 47** | **0.51721046 0.51426749 0.51359106 0.51290156 0.51268249]** | **[23, 33, 1, 21, 47])** |
| **3** | **[0.50927832 0.50656929 0.50612013 0.50475805 0.50407445]** | **49, 16, 42, 10, 25** | **[0.51811671 0.5156229 0.51449014 0.51381961 0.51313063]** | **47, 26, 32, 52, 9** | **[0.5181162 0.51676053 0.51630266 0.51426416 0.51426108]** | **52, 29, 23, 1, 47** |

Beta:

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| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **0.53668515 0.52898567 0.52853343 0.52490507 0.52378256]** | **30, 31, 1, 34, 18** | **[0.54732196 0.53803749 0.53691088 0.53645685 0.53645532]** | **34, 31, 47, 1, 30** | **[0.55026647 0.54890901 0.5461933 0.54144166 0.53940495]** | **34, 31, 5, 1, 12** |
| **2** | **[0.5400801 0.53170111 0.52852908 0.525139 0.52467985]** | **30, 9, 31, 2, 18** | **[0.54189133 0.53985436 0.53803903 0.53759551 0.53374218]** | **34, 35, 30, 1, 31** | **[0.55026826 0.54800787 0.54393163 0.540529 0.53917435]** | **5, 34, 1, 31, 33** |
| **3** | **[0.53464895 0.52988706 0.52966594 0.52446309 0.52332443]** | **30, 18, 10, 1, 42** | **[0.5439283 0.54008112 0.53895041 0.53464997 0.53464997]** | **34, 1, 18, 51, 35** | **[0.54846241 0.54845908 0.54755948 0.54393035 0.54189441]** | **5, 2, 31, 1, 34** |

Gamma:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.55072665 0.54551406 0.5452891 0.5425693 0.53804466]** | **47, 19, 18, 51, 1])** | **[0.55366782 0.55298499 0.54552072 0.54483635 0.54144166]** | **51, 47, 52, 25, 19])** | **[0.54211809 0.54098046 0.53804671 0.53759346 0.53691191]** | **[10, 51, 19, 14, 23])** |
| **2** | **[0.54777548 0.54664989 0.54484096 0.54370154 0.54076575]** | **51, 1, 18, 34, 47])** | **[0.55593642 0.55344004 0.55027365 0.54642288 0.54189415]** | **51, 47, 23, 50, 19])** | **[0.54030224 0.54007497 0.53782073 0.53736388 0.53668694]** | **[23, 19, 10, 1, 14])** |
| **3** | **[0.54665143 0.54597065 0.54189697 0.53985718 0.53872391]** | **47, 18, 51, 1, 19])** | **[0.55321431 0.54823027 0.54755487 0.54370692 0.5430287 ]** | **47, 51, 18, 50, 23])** | **[0.5443854 0.53985052 0.53940751 0.53601282 0.53465382]** | **51, 14, 1, 34, 13])** |

**Approach 1: Single Trail EEG Classification – 35 features**

Theta:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.52740068 0.51879929 0.51789303 0.51698319 0.5158535 ]** | **15, 4, 48, 26, 34])** | **[0.53034698 0.52558432 0.52491148 0.52106199 0.52105815]** | **14, 48, 37, 10, 43])** | **[0.52898387 0.52762769 0.52739888 0.52604116 0.52400214]** | **15, 14, 43, 39, 45])** |
| **2** | **[0.52445771 0.51992078 0.51902323 0.51902169 0.51607744]** | **15, 4, 43, 18, 49])** | **[0.52762461 0.52694178 0.52672271 0.52581748 0.5235517 ]** | **43, 26, 37, 13, 11])** | **[0.53237856 0.53170444 0.52241279 0.52219296 0.52174303]** | **15, 43, 25, 35, 14])** |
| **3** | **[0.52739632 0.52196492 0.51857356 0.51652839 0.51630292]** | **15, 48, 11, 17, 56])** | **[0.5253591 0.52467959 0.52083728 0.52083498 0.51947059]** | **13, 14, 34, 25, 15])** | **[0.5273976 0.52604065 0.52581876 0.52332315 0.52264724]]** | **14, 43, 48, 13, 15])** |

Alpha:

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| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.52264878 0.51743644 0.51698447 0.51652865 0.51562418]** | **16, 44, 55, 5, 28])** | **[0.51856895 0.51177547 0.51110211 0.51109878 0.5110952 ]** | **16, 40, 37, 14, 18])** | **[0.52196722 0.52128234 0.51675207 0.51652916 0.51517528]** | **47, 2, 30, 32, 31])** |
| **2** | **[0.52400675 0.51970171 0.51404099 0.51403868 0.51199812]** | **16, 37, 11, 1, 44])** | **[0.52242253 0.51947008 0.51380987 0.51267686 0.51109904** | **([37, 16, 12, 19, 5])** | **[0.52015214 0.51925178 0.51087177 0.50996807 0.50995936]** | **47, 1, 43, 46, 21])** |
| **3** | **[0.53464767 0.51743875 0.51720789 0.5131355 0.51291335]** | **16, 10, 11, 5, 2])** | **[0.51766346 0.51494929 0.51314036 0.51109597 0.50950764]** | **16, 37, 19, 5, 18])** | **[0.51267814 0.51267737 0.51222642 0.51222539 0.51041493]** | **1, 23, 3, 29, 47])** |

Beta:

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| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.53125042 0.52989244 0.52468241 0.52241869 0.52151115]** | **31, 34, 12, 47, 15])** | **[0.54710008 0.54551893 0.54506029 0.54461113 0.54392958]** | **34, 2, 31, 1, 19])** | **[0.5529914 0.55004433 0.54642826 0.54484686 0.54008548]** | **34, 5, 2, 43, 14])** |
| **2** | **[0.5403107 0.52694793 0.52626279 0.52558432 0.5253655 ]** | **[12, 30, 5, 18, 31])** | **[0.55502811 0.5486866 0.54846753 0.5434753 0.54166124]** | **34, 2, 31, 5, 1])** | **[0.5461974 0.54574287 0.54392471 0.54257621 0.54257186]** | **2, 34, 5, 35, 19])** |
| **3** | **[0.5314764 0.53034416 0.52876429 0.52875712 0.52762846]** | **47, 18, 5, 52, 34])** | **[0.54936149 0.54778368 0.54618972 0.54076216 0.54053386]** | **34, 31, 2, 30, 47])** | **[0.54778009 0.54732683 0.53963324 0.53872673 0.537585 ]** | **5, 1, 31, 2, 30]** |

Gamma:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | No scaling | | Standard Scaler | | -1 to 1 Feature Normalization | |
| Accuracies | Channels | Accuracies | Channels | Accuracies | Channels |
| **1** | **[0.55661412 0.54823565 0.54438668 0.54370615 0.54143321]** | **47, 42, 18, 51, 10])** | **[0.56793531 0.56385548 0.55525845 0.55412364 0.55298268]** | **47, 51, 18, 42, 14])** | **[0.53940136 0.53826937 0.53758885 0.53487648 0.53396637]** | **23, 19, 51, 13, 1])** |
| **2** | **[0.55593232 0.54506593 0.53600667 0.53441758 0.53306293]** | **47, 18, 51, 42, 19])** | **[0.56680204 0.56453908 0.56362975 0.55570915 0.55502503]** | **47, 18, 51, 52, 19])** | **[0.5396294 0.53962735 0.53940623 0.53668361 0.53645788]** | **[30, 10, 19, 23, 1])** |
| **3** | **[0.5452873 0.53894887 0.53600795 0.53464767 0.53374423]** | **47, 51, 18, 52, 42])** | **[0.56408403 0.56023506 0.55864725 0.55367039 0.553212 ]** | **[47, 18, 51, 10, 52])** | **[0.53985103 0.53963171 0.53962709 0.53894477 0.53781868]** | **51, 30, 19, 34, 22])** |