```cpp
    typedef double XFLOAT;
    typedef double OTA_FLOAT;

namespace POLQAV2
{

static const int qual_aNumberOfBarkBands_8k = 42;

static const XFLOAT qual_aCentreOfBandHz_8k[] = {
7.867213391919682,
31.634143268655833,
63.655891799098754,
96.124605518591650,
129.044974350629590,
162.421731986685330,
196.259656269227240,
230.563569577955180,
265.338339219281240,
300.588877819080660,
336.320143718741180,
372.537141374536420,
409.244921760350960,
446.448582773784950,
484.568596610231450,
526.600592888287570,
570.303849242400700,
619.423353339182310,
672.121604306886980,
728.525756853291340,
785.675989853772080,
846.835700313003260,
909.691610194635130,
977.063272971177870,
1049.861745293105300,
1129.636141508770800,
1217.257669480493400,
1312.109392538742400,
1412.501516206835000,
1517.999395469417500,
1628.894311753134400,
1746.194538120266300,
1871.568772689906600,
2008.776338188902900,
2158.979388843049500,
2326.743242983026000,
2513.787152431817500,
2722.488782060286700,
2952.586614693790600,
3205.835247616510500,
3492.680347943505200,
3820.219598636514500,
};

static const XFLOAT qual_aWidthOfBandHz_8k[] = {
15.734426783839364,
31.799432969632942,
32.244064091252888,
32.693363347732898,
33.147374316342976,
33.606140955768495,
34.069707609315316,
34.538119008140654,
35.011420274511437,
35.489656925087445,
35.972874874233582,
36.461120437356840,
36.954440334272249,
37.452881692595838,
40.269643618288683,
42.311851299831915,
45.992602608514972,
51.348464384927752,
55.04053097110124099,
56.77528070104210,
```

```
58.699369764471726,
62.445866689437935,
64.820925522595871,
69.195364254347510,
76.745707044252754,
84.016159884609124,
90.825685663805416,
97.931212000520645,
103.348886555479570,
107.801940408289740,
113.552247862722650,
121.490447376823570,
130.420569222977520,
143.431701144088950,
158.486701426626040,
176.872776192240510,
198.314560971309220,
219.549588310402210,
240.600248510215810,
268.703054594721380,
306.059403679688330,
349.937364906109000,
};

static const XFLOAT qual_aCentreOfBandBark_8k[] = {
0.078672133919197,
0.316341432686558,
0.636558917990988,
0.961246055185916,
1.290449743506296,
1.624217319866853,
1.962596562692272,
2.305635695779552,
2.653383392192812,
3.005888778190807,
3.363201437187412,
3.725371413745364,
4.092449217603510,
4.464485827737850,
4.841532696456650,
5.223641753529887,
5.610865410353339,
6.003256564147557,
6.400868602192050,
6.803755406094938,
7.211971356098372,
7.625571335420021,
8.044610734630901,
8.469145456069862,
8.899231918295030,
9.334927060572479,
9.776288347402467,
10.223373773083535,
10.676241866314763,
11.134951694836506,
11.599562870109931,
12.070135552035641,
12.546730453711742,
13.029408846231640,
13.518232563521924,
14.013264007220629,
14.514566151596222,
15.022202548507657,
15.536237332405801,
16.056735225376602,
16.583761542226299,
17.117382195609046,
};

static const XFLOAT qual_aWidthOfBandBark_8k[] = {
0.157344267838394,
0.317994329696329,
0.322440640912529,
0.326933633477329,
0.331473743163430,
0.336061409557685,
```

```
0.340697076093153,
0.345381190081407,
0.350114202745114,
0.354896569250875,
0.359728748742336,
0.364611204373568,
0.369544403342723,
0.374528816925959,
0.379564920511640,
0.384653193634836,
0.389794120012067,
0.394988187576368,
0.400235888512618,
0.405537719293158,
0.410894180713711,
0.416305777929586,
0.421773020492172,
0.427296422385751,
0.432876502064586,
0.438513782490313,
0.444208791169663,
0.449962060192473,
0.455774126269983,
0.461645530773504,
0.467576819773344,
0.473568544078077,
0.479621259274124,
0.485735525765673,
0.491919088148897,
0.498150978582512,
0.504453310168675,
0.510819483654194,
0.517250084142097,
0.523745701799506,
0.530306931899883,
0.536934374865616,
};

static const int qual_aNumberOfHzBandsInBarkBand_8k[] = {
1,
1,
1,
1,
1,
1,
1,
1,
2,
1,
1,
1,
1,
1,
2,
1,
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5,
4,
5,
6,
6,
```

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7,
8,
9,
9,
11,
};

static const XFLOAT qual_aPowerDensityCorrectionFactor_8k[] = {
100.000000000000000,
99.999999999999986,
100.000000000000000,
100.000000000000010,
99.999999999999986,
99.999999999999972,
100.000000000000070,
99.999999999999929,
50.000000000000043,
99.999999999999972,
100.000000000000030,
100.000000000000030,
99.999999999999957,
99.999999999999929,
53.047109258683179,
109.999999999999800,
117.992037968892770,
64.999999999999829,
68.760114411115339,
69.999999999999957,
71.428816127929494,
75.000000000000043,
76.843375907443658,
80.968808336850344,
88.646192018066856,
63.864324786237937,
68.155401595909368,
72.547755069712835,
75.584871685804970,
58.379174725066441,
80.950867722489420,
64.135619276263355,
54.384815810859074,
73.821912098150136,
64.437025648941329,
59.176429033466867,
65.521280487781439,
61.399824997118699,
58.144081530037795,
57.004563192383280,
64.126260403615447,
59.248372255360252,
};

static const XFLOAT qual_aT1_8k = 0.0770938698;

static const XFLOAT qual_aT20_8k[] = {
0.077093869803673,
0.094148285639443,
0.123060081399139,
0.134563351000337,
0.140713988142163,
0.144538671555516,
0.147145804624606,
0.149036440839478,
0.150469979113058,
0.151594125484436,
0.152499151486982,
0.153243331192947,
0.153865961872396,
0.154394505989731,
0.154853350584443,
0.155283509987372,
0.155664529012082,
0.156029468822096,
0.156362429750768,
0.156666052939686,
0.156929705866242,
```

```
0.157172829423245,
0.157388947729925,
0.157589984149038,
0.157778443865027,
0.157957277586417,
0.158126877377476,
0.158285103596123,
0.158429561637651,
0.158560891131512,
0.158680694803320,
0.158790937830731,
0.158893559432919,
0.158991247911919,
0.159084008063799,
0.159173505995100,
0.159259252660801,
0.159341063403773,
0.159417894862328,
0.159489740611646,
0.159558564108577,
0.159624540563461,
};

static const XFLOAT qual_aAbsoluteThresholdPower_8k[] = {
102329299228.075360000000000,
1995262314.968882800000000,
11220184.543019630000000,
245470.891568502850000,
29512.092266663902000,
6165.950018614822500,
1659.586907437561400,
724.435960074990590,
281.838293126445480,
154.881661891248110,
77.624711662869160,
48.977881936844611,
30.199517204020161,
19.952623149688797,
15.488166189124811,
11.481536214968829,
8.912509381337454,
7.244359600749901,
6.165950018614822,
5.248074602497725,
4.677351412871983,
4.265795188015927,
4.073802778041127,
3.981071705534972,
3.981071705534972,
3.981071705534972,
3.981071705534972,
4.168693834703354,
4.570881896148750,
4.897788193684463,
5.370317963702527,
5.888436553555890,
6.309573444801933,
6.918309709189366,
7.413102413009173,
7.762471166286917,
7.943282347242816,
7.943282347242816,
8.128305161640991,
8.317637711026709,
8.317637711026709,
8.317637711026709,
};

static const int qual_aNumberOfBarkBands_16k = 49;

static const XFLOAT qual_aCentreOfBandHz_16k[] = {
7.867213391919682,
31.634143268655833,
63.655897990098754,
96.124605518591650,
129.044974350629590,
```

```
    162.421731986685330,
    196.259656269227240,
    230.563569577955180,
    265.338339219281240,
    300.588877819080660,
    336.320143718741180,
    372.537141374536420,
    409.244921760350960,
    446.448582773784950,
    484.568596610231450,
    526.600592888287570,
    570.303849242400700,
    619.423353339182310,
    672.121604306886980,
    728.525756853291340,
    785.675989853772080,
    846.835700313003260,
    909.691610194635130,
    977.063272971177870,
    1049.861745293105300,
    1129.636141508770800,
    1217.257669480493400,
    1312.109392538742400,
    1412.501516206835000,
    1517.999395469417500,
    1628.894311753134400,
    1746.194538120266300,
    1871.568772689906600,
    2008.776338188902900,
    2158.979388843049500,
    2326.743242983026000,
    2513.787152431817500,
    2722.488782060286700,
    2952.586614693790600,
    3205.835247616510500,
    3492.680347943505200,
    3820.219598636514500,
    4193.939129343916600,
    4619.845883795305800,
    5100.437353963356100,
    5636.200046593819900,
    6234.312434981934500,
    6946.734992943288500,
    7796.472853895668800,
};

static const XFLOAT qual_aWidthOfBandHz_16k[] = {
    15.734426783839364,
    31.799432969632942,
    32.244064091252888,
    32.693363347732898,
    33.147374316342976,
    33.606140955768495,
    34.069707609315316,
    34.538119008140654,
    35.011420274511437,
    35.489656925087445,
    35.972874874233582,
    36.461120437356840,
    36.954440334272249,
    37.452881692595838,
    40.269643618288683,
    42.311851299831915,
    45.992602608514972,
    51.348464384927752,
    55.040530971124099,
    56.775280701042107,
    58.699369764471726,
    62.445866689437935,
    64.820925522595871,
    69.195364254347510,
    76.745707044252754,
    84.016159884609124,
    90.825685663805416,
    97.931212000520645,
    103.348886555479570,
```

```
107.801940408289740,
113.552247862722650,
121.490447376823570,
130.420569222977520,
143.431701144088950,
158.486701426626040,
176.872776192240510,
198.314560971309220,
219.549588310402210,
240.600248510215810,
268.703054594721380,
306.059403679688330,
349.937364906109000,
398.686610359186490,
454.713611741021850,
506.841513852932620,
564.863198713552260,
637.262576607390660,
794.715709200185300,
931.068552669087690,
};

static const XFLOAT qual_aCentreOfBandBark_16k[] = {
0.078672133919197,
0.316341432686558,
0.636558917990988,
0.961246055185916,
1.290449743506296,
1.624217319866853,
1.962596562692272,
2.305635695779552,
2.653383392192812,
3.005888778190807,
3.363201437187412,
3.725371413745364,
4.092449217603510,
4.464485827737850,
4.841532696456650,
5.223641753529887,
5.610865410353339,
6.003256564147557,
6.400868602192050,
6.803755406094938,
7.211971356098372,
7.625571335420021,
8.044610734630901,
8.469145456069862,
8.899231918295030,
9.334927060572479,
9.776288347402467,
10.223373773083535,
10.676241866314763,
11.134951694836506,
11.599562870109931,
12.070135552035641,
12.546730453711742,
13.029408846231640,
13.518232563521924,
14.013264007220629,
14.514566151596222,
15.022202548507657,
15.536237332405801,
16.056735225376602,
16.583761542226299,
17.117382195609046,
17.657663701197311,
18.204673182895327,
18.758478378096022,
19.319147642981740,
19.886749957869128,
20.461354932598510,
21.043032811968168,
};

static const XFLOAT qual_aWidthOfBandBark_16k[] = {
0.157344267838394,
```

```
0.317994329696329,
0.322440640912529,
0.326933633477329,
0.331473743163430,
0.336061409557685,
0.340697076093153,
0.345381190081407,
0.350114202745114,
0.354896569250875,
0.359728748742336,
0.364611204373568,
0.369544403342723,
0.374528816925959,
0.379564920511640,
0.384653193634836,
0.389794120012067,
0.394988187576368,
0.400235888512618,
0.405537719293158,
0.410894180713711,
0.416305777929586,
0.421773020492172,
0.427296422385751,
0.432876502064586,
0.438513782490313,
0.444208791169663,
0.449962060192473,
0.455774126269983,
0.461645530773504,
0.467576819773344,
0.473568544078077,
0.479621259274124,
0.485735525765673,
0.491911908814897,
0.498150978582512,
0.504453310168675,
0.510819483654194,
0.517250084142097,
0.523745701799506,
0.530306931899883,
0.536934374865616,
0.543628636310913,
0.550390327085115,
0.557220063316276,
0.564118466455167,
0.571086163319610,
0.578123786139155,
0.585231972600159,
};

static const int qual_aNumberOfHzBandsInBarkBand_16k[] = {
1,
1,
1,
1,
1,
1,
1,
1,
2,
1,
1,
1,
1,
1,
2,
1,
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3,
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6,
6,
7,
8,
9,
9,
12,
12,
15,
16,
18,
21,
25,
20,
};

static const XFLOAT qual_aPowerDensityCorrectionFactor_16k[] = {
100.000000000000000,
99.999999999999986,
100.000000000000000,
100.000000000000010,
99.999999999999986,
99.999999999999972,
100.000000000000070,
99.999999999999929,
50.000000000000043,
99.999999999999972,
100.000000000000030,
100.000000000000030,
99.999999999999957,
99.999999999999929,
53.047109258683179,
109.999999999999800,
117.992037968892770,
64.999999999999829,
68.760114411115339,
69.999999999999957,
71.428816127929494,
75.000000000000043,
76.843375907443658,
80.968808336850344,
88.646192018066856,
63.864324786237937,
68.155401595909368,
72.547755069712835,
75.584871685804970,
58.379174725066441,
80.950867722489420,
64.135619276263355,
54.384815810859074,
73.821912098150136,
64.437025648941329,
59.176429033466867,
65.521280487781439,
61.399824997118699,
58.144081530037795,
57.004563192383280,
64.126260403615447,
54.311007900746894,
61.115036952537203,
55.077713562445773,
56.849343197156585,
55.628898331612412,
53.137055194806393,
54.985851006579821,
79.546965670073760,
```

```
};

static const XFLOAT qual_aT1_16k = 0.0770938698;

static const XFLOAT qual_aT20_16k[] = {
0.077093869803673,
0.094148285639443,
0.123060081399139,
0.134563351000337,
0.140713988142163,
0.144538671555516,
0.147145804624606,
0.149036440839478,
0.150469979113058,
0.151594125484436,
0.152499151486982,
0.153243331192947,
0.153865961872396,
0.154394505989731,
0.154853350584443,
0.155283509987372,
0.155664529012082,
0.156029468822096,
0.156362429750768,
0.156666052939686,
0.156929705866242,
0.157172829423245,
0.157388947729925,
0.157589984149038,
0.157778443865027,
0.157957277586417,
0.158126877377476,
0.158285103596123,
0.158429561637651,
0.158560891131512,
0.158680694803320,
0.158790937830731,
0.158893559432919,
0.158991247911919,
0.159084008063799,
0.159173505995100,
0.159259252660801,
0.159341063403773,
0.159417894862328,
0.159489740611646,
0.159558564108577,
0.159624540563461,
0.159687257264811,
0.159746383260581,
0.159801262701207,
0.159851426442048,
0.159897256404505,
0.159941559333382,
0.159983824994766,
};

static const XFLOAT qual_aAbsoluteThresholdPower_16k[] = {
102329299228.075360000000000,
1995262314.968882800000000,
11220184.543019630000000,
245470.891568502850000,
29512.092266663902000,
6165.950018614822500,
1659.586907437561400,
724.435960074990590,
281.838293126445480,
154.881661891248110,
77.624711662869160,
48.977881936844611,
30.199517204020161,
19.952623149688797,
15.488166189124811,
11.481536214968829,
8.912509381337454,
7.24435960074901,
6.165950018614822,
```

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5.248074602497725,
4.677351412871983,
4.265795188015927,
4.073802778041127,
3.981071705534972,
3.981071705534972,
3.981071705534972,
4.168693834703354,
4.570881896148750,
4.897788193684463,
5.370317963702527,
5.888436553555890,
6.309573444801933,
6.918309709189366,
7.413102413009173,
7.762471166286917,
7.943282347242816,
7.943282347242816,
8.128305161640991,
8.317637711026709,
8.317637711026709,
8.317637711026709,
8.128305161640991,
7.585775750291840,
6.760829753919819,
5.888436553555890,
5.754399373371570,
6.606934480075959,
8.511380382023766,
};

static const int qual_aNumberOfBarkBands_48k = 63;

static const XFLOAT qual_aCentreOfBandHz_48k[] = {
5.910603491964197,
23.797443115244512,
47.958879939743021,
72.540984377384163,
97.549265318945217,
122.989295827799850,
148.866713840940120,
175.187222877351190,
201.956592753813740,
229.180660308209920,
256.865330130409010,
285.016575300810250,
313.640438136621240,
342.743030945949840,
372.330536789790190,
402.409210251982070,
432.985378217225730,
464.065440657234320,
497.221458567616080,
532.539540963797090,
569.472929105829850,
610.621808571419820,
654.429401632319810,
702.093572015565660,
750.803535707967510,
800.458340206575710,
854.331696206153420,
909.063191581837710,
967.774627918571010,
1029.896844548295600,
1098.619215137328000,
1173.720257940167800,
1254.169496431909700,
1340.822789979333500,
1431.973653931604300,
1527.049915220804200,
1627.551769290355700,
1733.227435980363500,
1846.263670199879000,
1968.793810035118900,
2101.915043737582400,
```

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2249.206520871338900,
2412.974855582727300,
2595.473393024933600,
2796.582747622492700,
3016.424742000808200,
3260.628330270893900,
3535.777932688708500,
3848.250218409411000,
4203.877374532146900,
4607.335464729203500,
5061.849338360401800,
5566.583563042058800,
6129.101797698542200,
6782.607399760106100,
7576.721253229217800,
8517.627097876013100,
9628.002979959626800,
11034.310560620694000,
12732.344379300084000,
14849.382859505577000,
17518.196174942277000,
21306.839738544175000,
};

static const XFLOAT qual_aWidthOfBandHz_48k[] = {
11.821206983928395,
23.952472262632238,
24.370401386364776,
24.793807488917508,
25.222754394204600,
25.657306623504667,
26.097529402775848,
26.543488670046258,
26.995251082878895,
27.452884025913505,
27.916455618484633,
28.386034722317845,
28.861690949304034,
29.343494669353220,
29.831517018327531,
30.325829906056242,
30.826506024431239,
31.333618855585939,
35.005191956674878,
35.604197844189684,
38.867883904794553,
43.140442578909642,
45.582627209681618,
48.321956872575583,
49.097970512228358,
51.829315558982103,
54.299719366179147,
56.406259870151757,
59.773624318352631,
66.265698878236435,
71.012557435947429,
77.932718023213965,
83.524071653636156,
88.852628188010385,
93.895100994097902,
97.636455890521574,
102.581087475984080,
109.686659872937980,
116.804486719206120,
128.271023838849030,
139.735272895473140,
155.223962470952760,
172.303422699709700,
192.017916451555270,
210.797077449661630,
230.621952843063810,
258.488469307555530,
292.228429511940250,
334.202572994827730,
378.319273137923120,
430.237268685910750,
```

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478.178690219849160,
531.44018382937130,
596.605519277164600,
731.36149145544740,
852.035132492492270,
1029.679957155479300,
1254.605733164360600,
1517.031051963887900,
1923.388407979558900,
2308.221899745212800,
3203.318449353662800,
4442.352348358261200,
};

static const XFLOAT qual_aCentreOfBandBark_48k[] = {
0.059106034919642,
0.237974431152445,
0.479588799397430,
0.725409843773842,
0.975492653189452,
1.229892958277999,
1.488667138409401,
1.751872228773512,
2.019565927538138,
2.291806603082099,
2.568653301304090,
2.850165753008103,
3.136404381366212,
3.427430309459498,
3.723305367897902,
4.024092102519821,
4.329853782172258,
4.640654406572343,
4.956558714251056,
5.277632190579974,
5.603941075881915,
5.935552373626306,
6.272533858710153,
6.614954085825469,
6.962882397914054,
7.316388934710504,
7.675544641374356,
8.040421277212252,
8.411091424491069,
8.787628497342915,
9.170106750762933,
9.558601289700839,
9.953188078247189,
10.353943948915271,
10.760946612019652,
11.174274665152332,
11.594007602757486,
12.020225825805825,
12.453010651569549,
12.892444323498950,
13.338610021201655,
13.791591870525579,
14.251474953746628,
14.718345319862225,
15.192289994991686,
15.673396992884598,
16.161755325538230,
16.657455013925130,
17.160587098831961,
17.671243651810776,
18.189517786243812,
18.715503668522992,
19.249296529345223,
19.790992675124794,
20.340689499523890,
20.898485495102562,
21.464480265089264,
22.038774535273230,
22.621470166019897,
23.212670164410618,
23.812478696507902,
```

```
24.421001099747521,
25.038334895458659,
};

static const XFLOAT qual_aWidthOfBandBark_48k[] = {
0.118212069839284,
0.239524722626322,
0.243704013863648,
0.247938074889175,
0.252227543942046,
0.256573066235047,
0.260975294027759,
0.265434886700463,
0.269952510828789,
0.274528840259135,
0.279164556184846,
0.283860347223178,
0.288616909493041,
0.293434946693532,
0.298315170183275,
0.303258299060563,
0.308265060244312,
0.313336188555859,
0.318472426801565,
0.323674525856271,
0.328943244747611,
0.334279350741173,
0.339683619426520,
0.345156834804111,
0.350699789373059,
0.356313284219842,
0.361998129107860,
0.367755142567931,
0.373585151989705,
0.379488993713990,
0.385467513126043,
0.391521564749771,
0.397652012342927,
0.403859728993236,
0.410145597215527,
0.416510509049832,
0.422955366160478,
0.429481079936199,
0.436088571591249,
0.442778772267552,
0.449552623137858,
0.456411075509989,
0.463355090932112,
0.47038564129082,
0.477503708959842,
0.484710286825980,
0.492006378481289,
0.499392998292507,
0.506871171521151,
0.51441934436480,
0.522106334429598,
0.529865430128755,
0.537720291515715,
0.545672000043425,
0.553721648754767,
0.561870342402575,
0.570119197570829,
0.578469342797106,
0.586921918696230,
0.595478078085204,
0.604138986109366,
0.612905820369871,
0.621779771052410,
};

static const int qual_aNumberOfHzBandsInBarkBand_48k[] = {
1,
1,
1,
1,
1,
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1,
1,
2,
1,
1,
1,
1,
1,
2,
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5,
5,
5,
6,
7,
7,
8,
9,
10,
11,
13,
14,
16,
19,
20,
23,
25,
31,
37,
44,
53,
65,
82,
98,
137,
190,
};

static const XFLOAT qual_aPowerDensityCorrectionFactor_48k[] = {
100.000000000000000,
100.000000000000010,
99.999999999999972,
100.000000000000000,
100.000000000000030,
99.999999999999986,
99.999999999999972,
50.000000000000007,
99.999999999999972,
100.000000000000090,
99.999999999999986,
100.000000000000000,
99.999999999999901,
50.000000000000036,
100.000000000000060,
```

```
99.99999999999957,
50.000000000000028,
99.99999999999986,
109.915926812421180,
54.999999999999808,
59.079924159282804,
129.055062728994700,
67.095709953040625,
69.999999999999986,
46.666666666666764,
72.729979282787326,
75.000000000000156,
51.126645006496013,
79.999999999999844,
58.206078855064298,
61.408164560184503,
66.350298459313208,
52.510781450293905,
55.002159047590062,
57.232786132260436,
58.603836979561144,
60.633518145897405,
51.078692402111095,
53.569157427353275,
57.939102718023022,
51.805308100946682,
48.585262215179050,
53.122918368870437,
51.026726687822617,
49.050713229908347,
47.579339475801461,
47.761477864917538,
45.012865697589092,
47.096015117871552,
45.962338970326940,
43.370603418710409,
45.122654076871363,
42.971025025806895,
43.733636267185183,
42.606797528538273,
40.984502679715781,
41.047235925030812,
40.921453454487924,
39.764981537624735,
39.390125443906719,
38.986533285924871,
38.149232254838559,
37.603027505849454,
};

static const XFLOAT qual_aT1_48k = 0.1450986831;

static const XFLOAT qual_aT20_48k[] = {
0.145098683087348,
0.147805247032314,
0.193338134801842,
0.211467665761431,
0.221163503657670,
0.227193090619346,
0.231303111317615,
0.234283360314810,
0.236542789854830,
0.238314292447551,
0.239740214862524,
0.240912454423327,
0.241892985823276,
0.242725121386982,
0.243440043064954,
0.244060770721161,
0.244604668434463,
0.245085080795452,
0.245532217051363,
0.245947998591998,
0.246328246536026,
0.246698284857524,
0.247041586817658,
```

```
0.247366886737641,
0.247657012631770,
0.247916710472696,
0.248164581327939,
0.248386525896917,
0.248596884433471,
0.248793510110283,
0.248985269856539,
0.249169288633657,
0.249342087159880,
0.249505125170130,
0.249655425002138,
0.249793158153387,
0.249921323858203,
0.250040115259688,
0.250152180071761,
0.250259169283855,
0.250361311299006,
0.250460275935711,
0.250556163800678,
0.250648797549971,
0.250736907272781,
0.250819811067525,
0.250898821119961,
0.250974790895663,
0.251047913298019,
0.251117928543347,
0.251184291774711,
0.251246396997785,
0.251303493284183,
0.251356057337813,
0.251406185563114,
0.251455470837454,
0.251501980303525,
0.251545180702490,
0.251587422776554,
0.251625998035075,
0.251661741133353,
0.251694494785568,
0.251726904176581,
};

static const XFLOAT qual_aAbsoluteThresholdPower_48k[] = {
102329299228.075360000000000,
10715193052.376049000000000,
48977881.936844662000000,
3019951.720402013000000,
245470.891568502850000,
58884.365535558958000,
8709.635899560806100,
3162.277660168379500,
1659.586907437561400,
724.435960074990590,
346.736850452531660,
186.208713666286740,
128.824955169313480,
77.624711662869160,
48.977881936844611,
33.113112148259113,
23.988329190194911,
18.197008586099834,
13.182567385564068,
10.715193052376065,
8.912509381337454,
7.585775750291840,
6.309573444801933,
5.623413251903491,
5.011872336272722,
4.570881896148750,
4.265795188015927,
4.073802778041127,
3.981071705534972,
3.981071705534972,
3.981071705534972,
3.981071705534972,
4.073802778041127,
```

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4.365158322401660,
4.570881896148750,
5.011872336272722,
5.370317963702527,
5.754399373371570,
6.309573444801933,
6.760829753919819,
7.244359600749901,
7.585775750291840,
7.762471166286917,
7.943282347242816,
7.943282347242816,
8.128305161640991,
8.317637711026709,
8.317637711026709,
8.317637711026709,
8.128305161640991,
7.585775750291840,
6.918309709189366,
6.025595860743578,
5.754399373371570,
6.165950018614822,
7.943282347242816,
14.125375446227540,
25.118864315095795,
47.863009232263849,
97.723722095581010,
354.813389233575320,
3090.295432513588800,
562341325.190349100000000,
};

static const int windowLen_8k = 256;
static const XFLOAT window_8k[] = {
0.000000000000000,
0.000150590651898,
0.000602271897414,
0.001354771660655,
0.002407636663902,
0.003760232700645,
0.005411745017610,
0.007361178805529,
0.009607359798385,
0.012148934980736,
0.014984373402728,
0.018111967102280,
0.021529832133896,
0.025235909703482,
0.029227967408490,
0.033503600582631,
0.038060233744357,
0.042895122148235,
0.048005353438279,
0.053387849402243,
0.059039367825823,
0.064956504445645,
0.071135694999864,
0.077573217375147,
0.084265193848728,
0.091207593424209,
0.098396234259678,
0.105826786186697,
0.113494773318632,
0.121395576746758,
0.129524437322521,
0.137876458524267,
0.146446609406727,
0.155229727631467,
0.164220522576491,
0.173413578523112,
0.182803357918178,
0.192384204709687,
0.202150347753784,
0.212095904291078,
0.222214883490200,
0.232501190056452,
```

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0.242948627903390,
0.253550903885109,
0.264301631587002,
0.275194335172698,
0.286222453284860,
0.297379342997506,
0.308658283817456,
0.320052481732507,
0.331555073303891,
0.343159129800556,
0.354857661372770,
0.366643621262552,
0.378509910048370,
0.390449379921567,
0.402454838991937,
0.414519055619851,
0.426634762772321,
0.438794662400394,
0.450991429835221,
0.463217718200168,
0.475466162836293,
0.487729385738546,
0.500000000000002,
0.512270614261458,
0.524533837163711,
0.536782281799836,
0.549008570164782,
0.561205337599610,
0.573365237227683,
0.585480944380153,
0.597545161008066,
0.609550620078437,
0.621490089951634,
0.633356378737451,
0.645142338627233,
0.656840870199448,
0.668444926696112,
0.679947518267496,
0.691341716182547,
0.702620657002497,
0.713777546715143,
0.724805664827305,
0.735698368413001,
0.746449096114894,
0.757051372096613,
0.767498809943551,
0.777785116509803,
0.787904095708925,
0.797849652246219,
0.807615795290315,
0.817196642081825,
0.826586421476890,
0.835779477423511,
0.844770272368535,
0.853553390593276,
0.862123541475735,
0.870475562677481,
0.878604423253244,
0.886505226681370,
0.894173213813305,
0.901603765740324,
0.908792406575794,
0.915734806151274,
0.922426782624855,
0.928864305000138,
0.935043495554357,
0.940960632174179,
0.946612150597759,
0.951994646561723,
0.957104877851767,
0.961939766255645,
0.966496399417371,
0.970772032591511,
0.974764090296519,
0.978470167866105,
0.981888032897721,
```

0.985015626597273,
0.987851065019265,
0.990392640201616,
0.992638821194471,
0.994588254982391,
0.996239767299355,
0.997592363336099,
0.998645228339345,
0.999397728102586,
0.999849409348102,
1.000000000000000,
0.999849409348102,
0.999397728102586,
0.998645228339345,
0.997592363336098,
0.996239767299355,
0.994588254982390,
0.992638821194470,
0.990392640201615,
0.987851065019263,
0.985015626597271,
0.981888032897719,
0.978470167866103,
0.974764090296517,
0.970772032591509,
0.966496399417368,
0.961939766255642,
0.957104877851764,
0.951994646561720,
0.946612150597756,
0.940960632174176,
0.935043495554354,
0.928864305000134,
0.922426782624851,
0.915734806151270,
0.908792406575789,
0.901603765740320,
0.894173213813301,
0.886505226681366,
0.878604423253240,
0.870475562677477,
0.862123541475730,
0.853553390593271,
0.844770272368530,
0.835779477423506,
0.826586421476885,
0.817196642081819,
0.807615795290310,
0.797849652246213,
0.787904095708919,
0.777785116509797,
0.767498809943545,
0.757051372096607,
0.746449096114888,
0.735698368412995,
0.724805664827299,
0.713777546715137,
0.702620657002491,
0.691341716182540,
0.679947518267489,
0.668444926696105,
0.656840870199441,
0.645142338627227,
0.633356378737445,
0.621490089951627,
0.609550620078430,
0.597545161008059,
0.585480944380146,
0.573365237227676,
0.561205337599603,
0.549008570164775,
0.536782281799828,
0.524533837163704,
0.512270614261451,
0.499999999999995,
0.487729385738539,

```
0.475466162836286,
0.463217718200161,
0.450991429835214,
0.438794662400386,
0.426634762772314,
0.414519055619844,
0.402454838991931,
0.390449379921560,
0.378509910048363,
0.366643621262545,
0.354857661372763,
0.343159129800549,
0.331555073303885,
0.320052481732501,
0.308658283817450,
0.297379342997500,
0.286222453284854,
0.275194335172692,
0.264301631586996,
0.253550903885103,
0.242948627903384,
0.232501190056446,
0.222214883490194,
0.212095904291073,
0.202150347753779,
0.192384204709682,
0.182803357918173,
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static const int windowLen_16k = 512;
static const XFLOAT window_16k[] = {
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static const int windowLen_48k = 2048;
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};

enum LC
{
    NB = 2,
    SWB = 3
};

class PolqaStatics
{
public:
    PolqaStatics()
    {
        startFrameIdx = 0; stopFrameIdx = 0; nrFrames = 0; nrSpeechFrames = 0;
frameLength = 1; nrTimesSamples = 0; sampleRate = 0;frameWindow = 0;

        aT1 = 0; aCentreOfBandHz = 0; aCentreOfBandBark = 0; aWidthOfBandHz = 0;
aWidthOfBandBark = 0; aPowerDensityCorrectionFactor = 0;
aAbsoluteThresholdPower = 0;
        aT20 = 0; aDifferenceBarkScalingLen = 0; aNumberOfBarkBands = 0;
aNumberOfHzBands = 0; aFrequencyResolutionHz = 0;

        aCalibrationFactorSp = 0; aCalibrationFactorSl = 0;

        listeningCondition = NB;
    }

    ~PolqaStatics(){}

    void setFrameLength(int newFrameLength)
```

```
    {
        ASSERT(newFrameLength >= 0);
        frameLength = newFrameLength;
        setFrameWindow();
        calcNrFrames();
        calcFreqRes();
        calcNumberOfHzBands();
    }

    void setNrTimeSamples(int newNrSamples)
    {
        nrTimesSamples = newNrSamples;
        calcNrFrames();
    }

    void setSampleRate(XFLOAT newSampleRate)
    {
        ASSERT((int)newSampleRate == 8000 || (int)newSampleRate == 16000 ||
(int)newSampleRate == 48000);
        sampleRate = newSampleRate;
        ZeroPaddingLength = 0.32 * newSampleRate;
        setBarkCoeffs();
        calcFreqRes();
    }

    void setStartFrameIndex(int newStartFrameIndex)
    {
        ASSERT(newStartFrameIndex >= 0);
        startFrameIdx = newStartFrameIndex;
        nrSpeechFrames = stopFrameIdx - startFrameIdx + 1;
    }

    void setStopFrameIndex(int newStopFrameIndex)
    {
        ASSERT(newStopFrameIndex <= nrFrames);
        stopFrameIdx = newStopFrameIndex;
        nrSpeechFrames = stopFrameIdx - startFrameIdx + 1;
    }

    void setNrFrames(int newNrFrames)
    {
        ASSERT(newNrFrames >= 0);
        nrFrames = newNrFrames;
    }

    void setACalibrationFactorSp(XFLOAT newACalibrationFactorSp)
    {
        ASSERT(newACalibrationFactorSp > 0);
        aCalibrationFactorSp = newACalibrationFactorSp;
    }

    void setACalibrationFactorSl(XFLOAT newACalibrationFactorSl)
    {
        ASSERT(newACalibrationFactorSl > 0);
        aCalibrationFactorSl = newACalibrationFactorSl;
    }

    void setListeningCondition(int newListeningCondition)
    {
        ASSERT(newListeningCondition == 2 || newListeningCondition == 3);
        listeningCondition = (LC)newListeningCondition;
    }

    XFLOAT const *frameWindow;
    int frameLength;
    int startFrameIdx;
    int stopFrameIdx;
    int nrFrames;
    int nrSpeechFrames;

    int nrTimesSamples;

    XFLOAT sampleRate;
    LC listeningCondition;

    int aNumberOfBarkBands;
```

```cpp
    XFLOAT aT1;
    XFLOAT const *aCentreOfBandHz;
    XFLOAT const *aCentreOfBandBark;
    XFLOAT const *aWidthOfBandHz;
    XFLOAT const *aWidthOfBandBark;
    XFLOAT const *aPowerDensityCorrectionFactor;
    XFLOAT const *aAbsoluteThresholdPower;
    XFLOAT const *aT20;
    int const *aNumberOfHzBandsInBarkBand;
    XFLOAT aDifferenceBarkScaling[6];
    int aDifferenceBarkScalingLen;

    int aNumberOfHzBands;
    XFLOAT aFrequencyResolutionHz;

    XFLOAT aCalibrationFactorSp;
    XFLOAT aCalibrationFactorSl;

    int ZeroPaddingLength;

private:

    void calcNrFrames()
    {
        const XFLOAT overlapFac = (XFLOAT)2.0;
        nrFrames = (int)floor(nrTimesSamples / ((XFLOAT) frameLength / overlapFac)-1);
    }

    void calcFreqRes()
    {
        if(frameLength)
            aFrequencyResolutionHz = sampleRate / frameLength;
    }

    void calcNumberOfHzBands()
    {
        aNumberOfHzBands = frameLength / 2;
    }

    void setFrameWindow()
    {
        switch((int)sampleRate)
        {
            case 8000:
                frameWindow = window_8k;
                break;
            case 16000:
                frameWindow = window_16k;
                break;
            case 48000:
                frameWindow = window_48k;
                break;
            default:
                ASSERT(false);
                break;
        }
    }

    void setBarkCoeffs();

};
}

namespace POLQAV2
{

void PolqaStatics::setBarkCoeffs()
{

    switch((int)sampleRate)
    {
        case 8000:
        {
            aNumberOfBarkBands = qual_aNumberOfBarkBands_8k;
            aT1 = qual_aT1_8k;
            aCentreOfBandHz = qual_aCentreOfBandHz_8k;
```

```
                aCentreOfBandBark = qual_aCentreOfBandBark_8k;
                aWidthOfBandHz = qual_aWidthOfBandHz_8k;
                aWidthOfBandBark = qual_aWidthOfBandBark_8k;
                aPowerDensityCorrectionFactor = qual_aPowerDensityCorrectionFactor_8k;
                aAbsoluteThresholdPower = qual_aAbsoluteThresholdPower_8k;
                aT20 = qual_aT20_8k;
                aNumberOfHzBandsInBarkBand = qual_aNumberOfHzBandsInBarkBand_8k;

                aDifferenceBarkScalingLen = 4;
                const XFLOAT scaling[] = {0,0,0.33,0.66};
                matbCopy(scaling, aDifferenceBarkScaling, aDifferenceBarkScalingLen);
                break;
        }
        case 16000:
        {
                aNumberOfBarkBands = qual_aNumberOfBarkBands_16k;
                aT1 = qual_aT1_16k;
                aCentreOfBandHz = qual_aCentreOfBandHz_16k;
                aCentreOfBandBark = qual_aCentreOfBandBark_16k;
                aWidthOfBandHz = qual_aWidthOfBandHz_16k;
                aWidthOfBandBark = qual_aWidthOfBandBark_16k;
                aPowerDensityCorrectionFactor = qual_aPowerDensityCorrectionFactor_16k;
                aAbsoluteThresholdPower = qual_aAbsoluteThresholdPower_16k;
                aT20 = qual_aT20_16k;
                aNumberOfHzBandsInBarkBand = qual_aNumberOfHzBandsInBarkBand_16k;

                aDifferenceBarkScalingLen = 4;
                const XFLOAT scaling[] = {0,0,0.33,0.66};
                matbCopy(scaling, aDifferenceBarkScaling, aDifferenceBarkScalingLen);
                break;
        }

        case 48000:
        {
                aNumberOfBarkBands = qual_aNumberOfBarkBands_48k;
                aT1 = qual_aT1_48k;
                aCentreOfBandHz = qual_aCentreOfBandHz_48k;
                aCentreOfBandBark = qual_aCentreOfBandBark_48k;
                aWidthOfBandHz = qual_aWidthOfBandHz_48k;
                aWidthOfBandBark = qual_aWidthOfBandBark_48k;
                aPowerDensityCorrectionFactor = qual_aPowerDensityCorrectionFactor_48k;
                aAbsoluteThresholdPower = qual_aAbsoluteThresholdPower_48k;
                aT20 = qual_aT20_48k;
                aNumberOfHzBandsInBarkBand = qual_aNumberOfHzBandsInBarkBand_48k;

                aDifferenceBarkScalingLen = 6;
                const XFLOAT scaling[] = {0,0,0.17,0.42,0.67,0.95};
                matbCopy(scaling, aDifferenceBarkScaling, aDifferenceBarkScalingLen);
                break;
        }
        default:
                ASSERT(false);
    }

}
}
```