

# fastp report

## Summary

### General

**fastp version:** 0.20.0 (<https://github.com/OpenGene/fastp>)

**sequencing:** paired end (151 cycles + 151 cycles)

**mean length before filtering:** 151bp, 151bp

**mean length after filtering:** 149bp, 149bp

**duplication rate:** 2.887696%

**Insert size peak:** 271

### Before filtering

**total reads:** 58.933488 M

**total bases:** 8.898957 G

**Q20 bases:** 8.576562 G (96.377167%)

**Q30 bases:** 8.130613 G (91.365912%)

**GC content:** 43.938143%

### After filtering

**total reads:** 57.928002 M

**total bases:** 8.658416 G

**Q20 bases:** 8.420592 G (97.253264%)

**Q30 bases:** 8.005770 G (92.462297%)

**GC content:** 43.584780%

# Filtering result

reads passed filters: 57.928002 M (98.293863%)

reads with low quality: 977.878000 K (1.659291%)

reads with too many N: 2.492000 K (0.004228%)

reads too short: 25.116000 K (0.042618%)

## Adapters

### Adapter or bad ligation of read1

**The input has little adapter percentage (~0.925241%), probably it's trimmed before.**

| Sequence | Occurrences |
|----------|-------------|
|----------|-------------|

all adapter sequences 811933

### Adapter or bad ligation of read2

**The input has little adapter percentage (~0.919160%), probably it's trimmed before.**

| Sequence | Occurrences |
|----------|-------------|
|----------|-------------|

## **Duplication**

### **Insert size estimation**

**This estimation is based on paired-end overlap analysis, and there are 89.639520% reads found not overlapped.**

**The nonoverlapped read pairs may have insert size  $<30$  or  $>272$ , or contain too much sequencing errors to be detected as overlapped.**

**Before filtering**

# Before filtering: read1: quality

Value of each position will be shown on mouse over.

# Before filtering: read1: base contents

Value of each position will be shown on mouse over.

# Before filtering: read1: KMER counting

Darker background means larger counts. The count will be shown on mouse over.

|     | AA    | AT    | AC    | AG    | TA     | TT     | TC     | TG     | CA     | CT     | CC     | CG     | GA     | GT     |
|-----|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| AAA | AAAAA | AAAAT | AAAAC | AAAAG | AAATA  | AAATT  | AAATC  | AAATG  | AAACA  | AAACT  | AAACC  | AAACG  | AAAGA  | AAAGT  |
| AAT | AATAA | AATAT | AATAC | AATAG | AATTA  | AATTT  | AATTC  | AATTG  | AATCA  | AATCT  | AATCC  | AATCG  | AATGA  | AATGT  |
| AAC | AACAA | AACAT | AACAC | AACAG | AAC TA | AAC TT | AAC TC | AAC TG | AAC CA | AAC CT | AAC CC | AAC CG | AAC GA | AAC GT |
| AAG | AAGAA | AAGAT | AAGAC | AAGAG | AAGTA  | AAGTT  | AAGTC  | AAGTG  | AAGCA  | AAGCT  | AAGCC  | AAGCG  | AAGGA  | AAGGT  |
| ATA | ATAAA | ATAAT | ATAAC | ATAAG | ATATA  | ATATT  | ATATC  | ATATG  | ATACA  | ATACT  | ATACC  | ATACG  | ATAGA  | ATAGT  |
| ATT | ATTAA | ATTAT | ATTAC | ATTAG | ATT TA | ATT TT | ATT TC | ATT TG | ATT CA | ATT CT | ATT CC | ATT CG | ATT GA | ATT GT |
| ATC | ATCAA | ATCAT | ATCAC | ATCAG | ATCTA  | ATCTT  | ATCTC  | ATCTG  | ATCCA  | ATCCT  | ATCCC  | ATCCG  | ATCGA  | ATCGT  |
| ATG | ATGAA | ATGAT | ATGAC | ATGAG | ATGTA  | ATGTT  | ATGTC  | ATGTG  | ATGCA  | ATGCT  | ATGCC  | ATGCG  | ATGGA  | ATGGT  |
| ACA | ACAAA | ACAAT | ACAAC | ACAAG | ACATA  | ACATT  | ACATC  | ACATG  | ACACA  | ACACT  | ACACC  | ACACG  | ACAGA  | ACAGT  |
| ACT | ACTAA | ACTAT | ACTAC | ACTAG | ACT TA | ACT TT | ACT TC | ACT TG | ACT CA | ACT CT | ACT CC | ACT CG | ACT GA | ACT GT |
| ACC | ACCAA | ACCAT | ACCAC | ACCAG | ACCTA  | ACCTT  | ACCTC  | ACCTG  | ACCCA  | ACCCT  | ACCCC  | ACCCG  | ACCGA  | ACCGT  |

|     |       |       |       |       |       |       |        |       |       |       |       |        |       |       |
|-----|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|--------|-------|-------|
|     |       |       |       |       |       |       |        |       |       |       |       |        |       |       |
| ACG | ACGAA | ACGAT | ACGAC | ACGAG | ACGTA | ACGTT | ACGTC  | ACGTG | ACGCA | ACGCT | ACGCC | ACGCG  | ACGGA | ACGGT |
| AGA | AGAAA | AGAAT | AGAAC | AGAAG | AGATA | AGATT | AGATC  | AGATG | AGACA | AGACT | AGACC | AGACG  | AGAGA | AGAGT |
| AGT | AGTAA | AGTAT | AGTAC | AGTAG | AGTTA | AGTTT | AGTTC  | AGTTG | AGTCA | AGTCT | AGTCC | AGTCG  | AGTGA | AGTGT |
| AGC | AGCAA | AGCAT | AGCAC | AGCAG | AGCTA | AGCTT | AGCTC  | AGCTG | AGCCA | AGCCT | AGCCC | AGCCG  | AGCGA | AGCGT |
| AGG | AGGAA | AGGAT | AGGAC | AGGAG | AGGTA | AGGTT | AGGTC  | AGGTG | AGGCA | AGGCT | AGGCC | AGGCG  | AGGGA | AGGGT |
| TAA | TAAAA | TAAAT | TAAAC | TAAAG | TAATA | TAATT | TAATC  | TAATG | TAACA | TAACT | TAACC | TAACG  | TAAGA | TAAGT |
| TAT | TATAA | TATAT | TATAC | TATAG | TATTA | TATTT | TATTC  | TATTG | TATCA | TATCT | TATCC | TATCG  | TATGA | TATGT |
| TAC | TACAA | TACAT | TACAC | TACAG | TACTA | TACTT | TACTC  | TACTG | TACCA | TACCT | TACCC | TACCG  | TACGA | TACGT |
| TAG | TAGAA | TAGAT | TAGAC | TAGAG | TAGTA | TAGTT | TAGTC  | TAGTG | TAGCA | TAGCT | TAGCC | TAGCG  | TAGGA | TAGGT |
| TTA | TTAAA | TTAAT | TTAAC | TTAAG | TTATA | TTATT | TTATC  | TTATG | TTACA | TTACT | TTACC | TTACG  | TTAGA | TTAGT |
| TTT | TTTAA | TTTAT | TTTAC | TTTAG | TTTTA | TTTTT | TTTTC  | TTTTG | TTTCA | TTTCT | TTTCC | TTTCG  | TTTGA | TTTGT |
| TTC | TTCAA | TTCAT | TTCAC | TTCAG | TTCTA | TTCTT | TTCTC  | TTCTG | TTCCA | TTCCT | TTCCC | TTCCG  | TTCGA | TTCGT |
| TTG | TTGAA | TTGAT | TTGAC | TTGAG | TTGTA | TTGTT | TTGTC  | TTGTG | TTGCA | TTGCT | TTGCC | TTGCG  | TTGGA | TTGGT |
| TCA | TCAAA | TCAAT | TCAAC | TCAAG | TCATA | TCATT | TCATC  | TCATG | TCACA | TCACT | TCACC | TCACG  | TCAGA | TCAGT |
| TCT | TCTAA | TCTAT | TCTAC | TCTAG | TCTTA | TCTTT | TCTTC  | TCTTG | TCTCA | TCTCT | TCTCC | TCTCG  | TCTGA | TCTGT |
| TCC | TCCAA | TCCAT | TCCAC | TCCAG | TCCTA | TCCTT | TCCTC  | TCCTG | TCCCA | TCCCT | TCCCC | TCCCG  | TCCGA | TCCGT |
| TCG | TCGAA | TCGAT | TCGAC | TCGAG | TCGTA | TCGTT | TCGTC  | TCGTG | TCGCA | TCGCT | TCGCC | TCGCG  | TCGGA | TCGGT |
| TGA | TGAAA | TGAAT | TGAAC | TGAAG | TGATA | TGATT | TGATC  | TGATG | TGACA | TGACT | TGACC | TGACG  | TGAGA | TGAGT |
| TGT | TGTAA | TGTAT | TGTAC | TGTAG | TGTTA | TGTTT | TGTTC  | TGTTG | TGTCA | TGTCT | TGTCC | TGTCTG | TGTGA | TGTGT |
| TGC | TGCAA | TGCAT | TGCAC | TGCAG | TGCTA | TGCTT | TGCTC  | TGCTG | TGCCA | TGCCT | TGCCC | TGCCG  | TGCGA | TGCGT |
| TGG | TGGAA | TGGAT | TGGAC | TGGAG | TGGTA | TGGTT | TGGTC  | TGGTG | TGGCA | TGGCT | TGGCC | TGGCG  | TGGGA | TGGGT |
| CAA | CAAAA | CAAAT | CAAAC | CAAAG | CAATA | CAATT | CAATC  | CAATG | CAACA | CAACT | CAACC | CAACG  | CAAGA | CAAGT |
| CAT | CATAA | CATAT | CATAC | CATAG | CATTA | CATTT | CATTC  | CATTG | CATCA | CATCT | CATCC | CATCG  | CATGA | CATGT |
| CAC | CACAA | CACAT | CACAC | CACAG | CACTA | CACCT | CACCTC | CACTG | CACCA | CACCT | CACCC | CACCG  | CACGA | CACGT |
| CAG | CAGAA | CAGAT | CAGAC | CAGAG | CAGTA | CAGTT | CAGTC  | CAGTG | CAGCA | CAGCT | CAGCC | CAGCG  | CAGGA | CAGGT |
| CTA | CTAAA | CTAAT | CTAAC | CTAAG | CTATA | CTATT | CTATC  | CTATG | CTACA | CTACT | CTACC | CTACG  | CTAGA | CTAGT |

|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| CTT | CTTAA | CTTAT | CTTAC | CTTAG | CTTTA | CTTTT | CTTTC | CTTTG | CTTCA | CTTCT | CTTCC | CTTCG | CTTGA | CTTGT |
| CTC | CTCAA | CTCAT | CTCAC | CTCAG | CTCTA | CTCTT | CTCTC | CTCTG | CTCCA | CTCCT | CTCCC | CTCCG | CTCGA | CTCGT |
| CTG | CTGAA | CTGAT | CTGAC | CTGAG | CTGTA | CTGTT | CTGTC | CTGTG | CTGCA | CTGCT | CTGCC | CTGCG | CTGGA | CTGGT |
| CCA | CCAAA | CCAAT | CCAAC | CCAAG | CCATA | CCATT | CCATC | CCATG | CCACA | CCACT | CCACC | CCACG | CCAGA | CCAGT |
| CCT | CCTAA | CCTAT | CCTAC | CCTAG | CCTTA | CCTTT | CCTTC | CCTTG | CCTCA | CCTCT | CCTCC | CCTCG | CCTGA | CCTGT |
| CCC | CCCAA | CCCAT | CCCAC | CCCAG | CCCTA | CCCTT | CCCTC | CCCTG | CCCCA | CCCCT | CCCCC | CCCCG | CCCGA | CCCGT |
| CCG | CCGAA | CCGAT | CCGAC | CCGAG | CCGTA | CCGTT | CCGTC | CCGTG | CCGCA | CCGCT | CCGCC | CCGCG | CCGGA | CCGGT |
| CGA | CGAAA | CGAAT | CGAAC | CGAAG | CGATA | CGATT | CGATC | CGATG | CGACA | CGACT | CGACC | CGACG | CGAGA | CGAGT |
| CGT | CGTAA | CGTAT | CGTAC | CGTAG | CGTTA | CGTTT | CGTTC | CGTTG | CGTCA | CGTCT | CGTCC | CGTCG | CGTGA | CGTGT |
| CGC | CGCAA | CGCAT | CGCAC | CGCAG | CGCTA | CGCTT | CGCTC | CGCTG | CGCCA | CGCCT | CGCCC | CGCCG | CGCGA | CGCGT |
| CGG | CGGAA | CGGAT | CGGAC | CGGAG | CGGTA | CGGTT | CGGTC | CGGTG | CGGCA | CGGCT | CGGCC | CGGCG | CGGGA | CGGGT |
| GAA | GAAAA | GAAAT | GAAAC | GAAAG | GAATA | GAATT | GAATC | GAATG | GAACA | GAACT | GAACC | GAACG | GAAGA | GAAGT |
| GAT | GATAA | GATAT | GATAC | GATAG | GATTA | GATTT | GATTC | GATTG | GATCA | GATCT | GATCC | GATCG | GATGA | GATGT |
| GAC | GACAA | GACAT | GACAC | GACAG | GACTA | GACTT | GACTC | GACTG | GACCA | GACCT | GACCC | GACCG | GACGA | GACGT |
| GAG | GAGAA | GAGAT | GAGAC | GAGAG | GAGTA | GAGTT | GAGTC | GAGTG | GAGCA | GAGCT | GAGCC | GAGCG | GAGGA | GAGGT |
| GTA | GTAAA | GTAAT | GTAAC | GTAAG | GTATA | GTATT | GTATC | GTATG | GTACA | GTACT | GTACC | GTACG | GTAGA | GTAGT |
| GTT | GTTAA | GTTAT | GTTAC | GTTAG | GTTTA | GTTTT | GTTTC | GTTTG | GTTCA | GTTCT | GTTCC | GTTCG | GTTGA | GTTGT |
| GTC | GTCAA | GTCAT | GTCAC | GTCAG | GTCTA | GTCTT | GTCTC | GTCTG | GTCCA | GTCCT | GTCCC | GTCCG | GTCGA | GTCGT |
| GTG | GTGAA | GTGAT | GTGAC | GTGAG | GTGTA | GTGTT | GTGTC | GTGTG | GTGCA | GTGCT | GTGCC | GTGCG | GTGGA | GTGGT |
| GCA | GCAAA | GCAAT | GCAAC | GCAAG | GCATA | GCATT | GCATC | GCATG | GCACA | GCACT | GCACC | GCACG | GCAGA | GCAGT |
| GCT | GCTAA | GCTAT | GCTAC | GCTAG | GCTTA | GCTTT | GCTTC | GCTTG | GCTCA | GCTCT | GCTCC | GCTCG | GCTGA | GCTGT |
| GCC | GCCAA | GCCAT | GCCAC | GCCAG | GCCTA | GCCTT | GCCTC | GCCTG | GCCCA | GCCCT | GCCCC | GCCCG | GCCGA | GCCGT |
| GCG | GCGAA | GCGAT | GCGAC | GCGAG | GCGTA | GCGTT | GCGTC | GCGTG | GCGCA | GCGCT | GCGCC | GCGCG | GCGGA | GCGGT |
| GGA | GGAAA | GGAAT | GGAAC | GGAAG | GGATA | GGATT | GGATC | GGATG | GGACA | GGACT | GGACC | GGACG | GGAGA | GGAGT |
| GGT | GGTAA | GGTAT | GGTAC | GGTAG | GGTTA | GGTTT | GGTTC | GGTTG | GGTCA | GGTCT | GGTCC | GGTCG | GGTGA | GGTGT |
| GGC | GGCAA | GGCAT | GGCAC | GGCAG | GGCTA | GGCTT | GGCTC | GGCTG | GGCCA | GGCCT | GGCCC | GGCCG | GGCGA | GGCGT |

|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| GGG | GGGAA | GGGAT | GGGAC | GGGAG | GGGTA | GGGTT | GGGTC | GGGTG | GGGCA | GGGCT | GGGCC | GGGCG | GGGGA | GGGGT |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

## Before filtering: read2: quality

Value of each position will be shown on mouse over.

## Before filtering: read2: base contents

Value of each position will be shown on mouse over.

## Before filtering: read2: KMER counting

Darker background means larger counts. The count will be shown on mouse over.

|     | AA    | AT    | AC    | AG    | TA    | TT     | TC     | TG     | CA      | CT      | CC      | CG      | GA      | GT      |
|-----|-------|-------|-------|-------|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| AAA | AAAAA | AAAAT | AAAAC | AAAAG | AAATA | AAATT  | AAATC  | AAATG  | AAACA   | AAACT   | AAACC   | AAACG   | AAAGA   | AAAGT   |
| AAT | AATAA | AATAT | AATAC | AATAG | AATTA | AATTT  | AATTC  | AATTG  | AATCA   | AATCT   | AATCC   | AATCG   | AATGA   | AATGT   |
| AAC | AACAA | AACAT | AACAC | AACAG | AACTA | AAC TT | AAC TC | AAC TG | AAC CA  | AAC CT  | AAC CC  | AAC CG  | AAC GA  | AAC GT  |
| AAG | AAGAA | AAGAT | AAGAC | AAGAG | AAGTA | AAGTT  | AAGTC  | AAGTG  | AAGCA   | AAGCT   | AAGCC   | AAGCG   | AAGGA   | AAGGT   |
| ATA | ATAAA | ATAAT | ATAAC | ATAAG | ATATA | ATATT  | ATATC  | ATATG  | ATACA   | ATACT   | ATACC   | ATACG   | ATAGA   | ATAGT   |
| ATT | ATTAA | ATTAT | ATTAC | ATTAG | ATTTA | ATTTT  | ATTT C | ATTT G | ATTT CA | ATTT CT | ATTT CC | ATTT CG | ATTT GA | ATTT GT |

|     |       |       |       |       |       |       |       |       |       |       |       |        |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| ATC | ATCAA | ATCAT | ATCAC | ATCAG | ATCTA | ATCTT | ATCTC | ATCTG | ATCCA | ATCCT | ATCCC | ATCCG  | ATCGA | ATCGT |
| ATG | ATGAA | ATGAT | ATGAC | ATGAG | ATGTA | ATGTT | ATGTC | ATGTG | ATGCA | ATGCT | ATGCC | ATGCG  | ATGGA | ATGGT |
| ACA | ACAAA | ACAAT | ACAAC | ACAAG | ACATA | ACATT | ACATC | ACATG | ACACA | ACACT | ACACC | ACACG  | ACAGA | ACAGT |
| ACT | ACTAA | ACTAT | ACTAC | ACTAG | ACTTA | ACTTT | ACTTC | ACTTG | ACTCA | ACTCT | ACTCC | ACTCG  | ACTGA | ACTGT |
| ACC | ACCAA | ACCAT | ACCAC | ACCAG | ACCTA | ACCTT | ACCTC | ACCTG | ACCCA | ACCCT | ACCCC | ACCCG  | ACCGA | ACCGT |
| ACG | ACGAA | ACGAT | ACGAC | ACGAG | ACGTA | ACGTT | ACGTC | ACGTG | ACGCA | ACGCT | ACGCC | ACGCG  | ACGGA | ACGGT |
| AGA | AGAAA | AGAAT | AGAAC | AGAAG | AGATA | AGATT | AGATC | AGATG | AGACA | AGACT | AGACC | AGACG  | AGAGA | AGAGT |
| AGT | AGTAA | AGTAT | AGTAC | AGTAG | AGTTA | AGTTT | AGTTC | AGTTG | AGTCA | AGTCT | AGTCC | AGTCG  | AGTGA | AGTGT |
| AGC | AGCAA | AGCAT | AGCAC | AGCAG | AGCTA | AGCTT | AGCTC | AGCTG | AGCCA | AGCCT | AGCCC | AGCCG  | AGCGA | AGCGT |
| AGG | AGGAA | AGGAT | AGGAC | AGGAG | AGGTA | AGGTT | AGGTC | AGGTG | AGGCA | AGGCT | AGGCC | AGGCG  | AGGGA | AGGGT |
| TAA | TAAAA | TAAAT | TAAAC | TAAAG | TAATA | TAATT | TAATC | TAATG | TAACA | TAACT | TAACC | TAACG  | TAAGA | TAAGT |
| TAT | TATAA | TATAT | TATAC | TATAG | TATTA | TATTT | TATTC | TATTG | TATCA | TATCT | TATCC | TATCG  | TATGA | TATGT |
| TAC | TACAA | TACAT | TACAC | TACAG | TACTA | TACTT | TACTC | TACTG | TACCA | TACCT | TACCC | TACCG  | TACGA | TACGT |
| TAG | TAGAA | TAGAT | TAGAC | TAGAG | TAGTA | TAGTT | TAGTC | TAGTG | TAGCA | TAGCT | TAGCC | TAGCG  | TAGGA | TAGGT |
| TTA | TTAAA | TTAAT | TTAAC | TTAAG | TTATA | TTATT | TTATC | TTATG | TTACA | TTACT | TTACC | TTACG  | TTAGA | TTAGT |
| TTT | TTTAA | TTTAT | TTTAC | TTTAG | TTTTA | TTTTT | TTTTC | TTTTG | TTTCA | TTTCT | TTTCC | TTTCG  | TTTGA | TTTGT |
| TTC | TTCAA | TTCAT | TTCAC | TTCAG | TTCTA | TTCTT | TTCTC | TTCTG | TTCCA | TTCCT | TTCCC | TTCCG  | TTCGA | TTCGT |
| TTG | TTGAA | TTGAT | TTGAC | TTGAG | TTGTA | TTGTT | TTGTC | TTGTG | TTGCA | TTGCT | TTGCC | TTGCG  | TTGGA | TTGGT |
| TCA | TCAAA | TCAAT | TCAAC | TCAAG | TCATA | TCATT | TCATC | TCATG | TCACA | TCACT | TCACC | TCACG  | TCAGA | TCAGT |
| TCT | TCTAA | TCTAT | TCTAC | TCTAG | TCTTA | TCTTT | TCTTC | TCTTG | TCTCA | TCTCT | TCTCC | TCTCG  | TCTGA | TCTGT |
| TCC | TCCAA | TCCAT | TCCAC | TCCAG | TCCTA | TCCTT | TCCTC | TCCTG | TCCCA | TCCCT | TCCCC | TCCCG  | TCCGA | TCCGT |
| TCG | TCGAA | TCGAT | TCGAC | TCGAG | TCGTA | TCGTT | TCGTC | TCGTG | TCGCA | TCGCT | TCGCC | TCGCG  | TCGGA | TCGGT |
| TGA | TGAAA | TGAAT | TGAAC | TGAAG | TGATA | TGATT | TGATC | TGATG | TGACA | TGACT | TGACC | TGACG  | TGAGA | TGAGT |
| TGT | TGTAA | TGTAT | TGTAC | TGTAG | TGTTA | TGTTT | TGTTC | TGTTG | TGTCA | TGTCT | TGTCC | TGTCTG | TGTGA | TGTGT |
| TGC | TGCAA | TGCAT | TGCAC | TGCAG | TGCTA | TGCTT | TGCTC | TGCTG | TGCCA | TGCCT | TGCCC | TGCCG  | TGCCA | TGCGT |
| TGG | TGGAA | TGGAT | TGGAC | TGGAG | TGGTA | TGGTT | TGGTC | TGGTG | TGGCA | TGGCT | TGGCC | TGGCG  | TGGGA | TGGGT |
| CAA | CAAAA | CAAAT | CAAAC | CAAAG | CAATA | CAATT | CAATC | CAATG | CAACA | CAACT | CAACC | CAACG  | CAAGA | CAAGT |



|     |       |       |       |       |       |        |        |        |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
|     |       |       |       |       |       |        |        |        |       |       |       |       |       |       |
| CAT | CATAA | CATAT | CATAC | CATAG | CATTA | CATTT  | CATTC  | CATTG  | CATCA | CATCT | CATCC | CATCG | CATGA | CATGT |
| CAC | CACAA | CACAT | CACAC | CACAG | CACTA | CAC TT | CAC TC | CAC TG | CACCA | CACCT | CACCC | CACCG | CACGA | CACGT |
| CAG | CAGAA | CAGAT | CAGAC | CAGAG | CAGTA | CAG TT | CAG TC | CAG TG | CAGCA | CAGCT | CAGCC | CAGCG | CAGGA | CAGGT |
| CTA | CTAAA | CTAAT | CTAAC | CTAAG | CTATA | CTATT  | CTATC  | CTATG  | CTACA | CTACT | CTACC | CTACG | CTAGA | CTAGT |
| CTT | CTTAA | CTTAT | CTTAC | CTTAG | CTTTA | CTTTT  | CTTTC  | CTTTG  | CTTCA | CTTCT | CTTCC | CTTCG | CTTGA | CTTGT |
| CTC | CTCAA | CTCAT | CTCAC | CTCAG | CTCTA | CTCTT  | CTCTC  | CTCTG  | CTCCA | CTCCT | CTCCC | CTCCG | CTCGA | CTCGT |
| CTG | CTGAA | CTGAT | CTGAC | CTGAG | CTGTA | CTG TT | CTG TC | CTG TG | CTGCA | CTGCT | CTGCC | CTGCG | CTGGA | CTGGT |
| CCA | CCAAA | CCAAT | CCAAC | CCAAG | CCATA | CCATT  | CCATC  | CCATG  | CCACA | CCACT | CCACC | CCACG | CCAGA | CCAGT |
| CCT | CCTAA | CCTAT | CCTAC | CCTAG | CCTTA | CCTTT  | CCTTC  | CCTTG  | CCTCA | CCTCT | CCTCC | CCTCG | CCTGA | CCTGT |
| CCC | CCCAA | CCCAT | CCCAC | CCCAG | CCCTA | CCCTT  | CCCTC  | CCCTG  | CCCCA | CCCCT | CCCCC | CCCCG | CCCGA | CCCGT |
| CCG | CCGAA | CCGAT | CCGAC | CCGAG | CCGTA | CCG TT | CCG TC | CCG TG | CCGCA | CCGCT | CCGCC | CCGCG | CCGGA | CCGGT |
| CGA | CGAAA | CGAAT | CGAAC | CGAAG | CGATA | CGATT  | CGATC  | CGATG  | CGACA | CGACT | CGACC | CGACG | CGAGA | CGAGT |
| CGT | CGTAA | CGTAT | CGTAC | CGTAG | CGTTA | CGTTT  | CGTTC  | CGTTG  | CGTCA | CGTCT | CGTCC | CGTCG | CGTGA | CGTGT |
| CGC | CGCAA | CGCAT | CGCAC | CGCAG | CGCTA | CGCTT  | CGCTC  | CGCTG  | CGCCA | CGCCT | CGCCC | CGCCG | CGCGA | CGCGT |
| CGG | CGGAA | CGGAT | CGGAC | CGGAG | CGGTA | CGG TT | CGG TC | CGG TG | CGGCA | CGGCT | CGGCC | CGGCG | CGGGA | CGGGT |
| GAA | GAAAA | GAAAT | GAAAC | GAAAG | GAATA | GAATT  | GAATC  | GAATG  | GAACA | GAACT | GAACC | GAACG | GAAGA | GAAGT |
| GAT | GATAA | GATAT | GATAC | GATAG | GATTA | GATTT  | GATTC  | GATTG  | GATCA | GATCT | GATCC | GATCG | GATGA | GATGT |
| GAC | GACAA | GACAT | GACAC | GACAG | GACTA | GACTT  | GACTC  | GACTG  | GACCA | GACCT | GACCC | GACCG | GACGA | GACGT |
| GAG | GAGAA | GAGAT | GAGAC | GAGAG | GAGTA | GAG TT | GAG TC | GAG TG | GAGCA | GAGCT | GAGCC | GAGCG | GAGGA | GAGGT |
| GTA | GTAAA | GTAAT | GTAAC | GTAAG | GTATA | GTATT  | GTATC  | GTATG  | GTACA | GTACT | GTACC | GTACG | GTAGA | GTAGT |
| GTT | GTTAA | GTTAT | GTTAC | GTTAG | GTTTA | GTTTT  | GTTTC  | GTTTG  | GTTCA | GTTCT | GTTCC | GTTCG | GTTGA | GTTGT |
| GTC | GTCAA | GTCAT | GTCAC | GTCAG | GTCTA | GTCTT  | GTCTC  | GTCTG  | GTCCA | GTCCT | GTCCC | GTCCG | GTCGA | GTCGT |
| GTG | GTGAA | GTGAT | GTGAC | GTGAG | GTGTA | GTG TT | GTG TC | GTG TG | GTGCA | GTGCT | GTGCC | GTGCG | GTGGA | GTGGT |
| GCA | GCAAA | GCAAT | GCAAC | GCAAG | GCATA | GCATT  | GCATC  | GCATG  | GCACA | GCACT | GCACC | GCACG | GCAGA | GCAGT |
| GCT | GCTAA | GCTAT | GCTAC | GCTAG | GCTTA | GCTTT  | GCTTC  | GCTTG  | GCTCA | GCTCT | GCTCC | GCTCG | GCTGA | GCTGT |
| GCC | GCCAA | GCCAT | GCCAC | GCCAG | GCCTA | GCCTT  | GCCTC  | GCCTG  | GCCCA | GCCCT | GCCCC | GCCCG | GCCGA | GCCGT |

|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| GCG | GCGAA | GCGAT | GCGAC | GCGAG | GCGTA | GCGTT | GCGTC | GCGTG | GCGCA | GCGCT | GCGCC | GCGCG | GCGGA | GCGGT |
| GGA | GGAAA | GGAAT | GGAAC | GGAAG | GGATA | GGATT | GGATC | GGATG | GGACA | GGACT | GGACC | GGACG | GGAGA | GGAGT |
| GGT | GGTAA | GGTAT | GGTAC | GGTAG | GGTTA | GGTTT | GGTTC | GGTTG | GGTCA | GGTCT | GGTCC | GGTCG | GGTGA | GGTGT |
| GGC | GGCAA | GGCAT | GGCAC | GGCAG | GGCTA | GGCTT | GGCTC | GGCTG | GGCCA | GGCCT | GGCCC | GGCCG | GGCGA | GGCGT |
| GGG | GGGAA | GGGAT | GGGAC | GGGAG | GGGTA | GGGTT | GGGTC | GGGTG | GGGCA | GGGCT | GGGCC | GGGCG | GGGGA | GGGGT |

## After filtering

### After filtering: read1: quality

Value of each position will be shown on mouse over.

### After filtering: read1: base contents

Value of each position will be shown on mouse over.

### After filtering: read1: KMER counting

Darker background means larger counts. The count will be shown on mouse over.

|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|     | AA    | AT    | AC    | AG    | TA    | TT    | TC    | TG    | CA    | CT    | CC    | CG    | GA    | GT    |
| AAA | AAAAA | AAAAT | AAAAC | AAAAG | AAATA | AAATT | AAATC | AAATG | AAACA | AAACT | AAACC | AAACG | AAAGA | AAAGT |

|     |       |       |       |       |        |        |        |        |        |        |        |        |        |        |
|-----|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|     |       |       |       |       |        |        |        |        |        |        |        |        |        |        |
| AAT | AATAA | AATAT | AATAC | AATAG | AATTA  | AATTT  | AATTC  | AATTG  | AATCA  | AATCT  | AATCC  | AATCG  | AATGA  | AATGT  |
| AAC | AACAA | AACAT | AACAC | AACAG | AAC TA | AAC TT | AAC TC | AAC TG | AAC CA | AAC CT | AAC CC | AAC CG | AAC GA | AAC GT |
| AAG | AAGAA | AAGAT | AAGAC | AAGAG | AAGTA  | AAGTT  | AAGTC  | AAGTG  | AAGCA  | AAGCT  | AAGCC  | AAGCG  | AAGGA  | AAGGT  |
| ATA | ATAAA | ATAAT | ATAAC | ATAAG | ATATA  | ATATT  | ATATC  | ATATG  | ATACA  | ATACT  | ATACC  | ATACG  | ATAGA  | ATAGT  |
| ATT | ATTAA | ATTAT | ATTAC | ATTAG | ATTTA  | ATTTT  | ATTT C | ATTT G | ATTCA  | ATTCT  | ATTCC  | ATT CG | ATTGA  | ATTGT  |
| ATC | ATCAA | ATCAT | ATCAC | ATCAG | ATCTA  | ATCTT  | ATCTC  | ATCTG  | ATCCA  | ATCCT  | ATCCC  | ATCCG  | ATCGA  | ATCGT  |
| ATG | ATGAA | ATGAT | ATGAC | ATGAG | ATGTA  | ATGTT  | ATGTC  | ATGTG  | ATGCA  | ATGCT  | ATGCC  | ATGCG  | ATGGA  | ATGGT  |
| ACA | ACAAA | ACAAT | ACAAC | ACAAG | ACATA  | ACATT  | ACATC  | ACATG  | ACACA  | ACACT  | ACACC  | ACACG  | ACAGA  | ACAGT  |
| ACT | ACTAA | ACTAT | ACTAC | ACTAG | ACTTA  | ACTTT  | ACTTC  | ACTTG  | ACTCA  | ACTCT  | ACTCC  | ACTCG  | ACTGA  | ACTGT  |
| ACC | ACCAA | ACCAT | ACCAC | ACCAG | ACCTA  | ACCTT  | ACCTC  | ACCTG  | ACCCA  | ACCCT  | ACCCC  | ACCCG  | ACCGA  | ACCGT  |
| ACG | ACGAA | ACGAT | ACGAC | ACGAG | ACGTA  | ACGTT  | ACGTC  | ACGTG  | ACGCA  | ACGCT  | ACGCC  | ACGCG  | ACGGA  | ACGGT  |
| AGA | AGAAA | AGAAT | AGAAC | AGAAG | AGATA  | AGATT  | AGATC  | AGATG  | AGACA  | AGACT  | AGACC  | AGACG  | AGAGA  | AGAGT  |
| AGT | AGTAA | AGTAT | AGTAC | AGTAG | AGTTA  | AGTTT  | AGTTC  | AGTTG  | AGTCA  | AGTCT  | AGTCC  | AGTCG  | AGTGA  | AGTGT  |
| AGC | AGCAA | AGCAT | AGCAC | AGCAG | AGCTA  | AGCTT  | AGCTC  | AGCTG  | AGCCA  | AGCCT  | AGCCC  | AGCCG  | AGCGA  | AGCGT  |
| AGG | AGGAA | AGGAT | AGGAC | AGGAG | AGGTA  | AGGTT  | AGGTC  | AGGTG  | AGGCA  | AGGCT  | AGGCC  | AGGCG  | AGGGA  | AGGGT  |
| TAA | TAAAA | TAAAT | TAAAC | TAAAG | TAATA  | TAATT  | TAATC  | TAATG  | TAACA  | TAACT  | TAACC  | TAACG  | TAAGA  | TAAGT  |
| TAT | TATAA | TATAT | TATAC | TATAG | TATTA  | TATTT  | TATTC  | TATTG  | TATCA  | TATCT  | TATCC  | TATCG  | TATGA  | TATGT  |
| TAC | TACAA | TACAT | TACAC | TACAG | TACTA  | TACTT  | TACTC  | TACTG  | TACCA  | TACCT  | TACCC  | TACCG  | TACGA  | TACGT  |
| TAG | TAGAA | TAGAT | TAGAC | TAGAG | TAGTA  | TAGTT  | TAGTC  | TAGTG  | TAGCA  | TAGCT  | TAGCC  | TAGCG  | TAGGA  | TAGGT  |
| TTA | TTAAA | TTAAT | TTAAC | TTAAG | TTATA  | TTATT  | TTATC  | TTATG  | TTACA  | TTACT  | TTACC  | TTACG  | TTAGA  | TTAGT  |
| TTT | TTTAA | TTTAT | TTTAC | TTTAG | TTTTA  | TTTTT  | TTTT C | TTTT G | TTTCA  | TTTCT  | TTTCC  | TTTCG  | TTTGA  | TTTGT  |
| TTC | TTCAA | TTCAT | TTCAC | TTCAG | TTCTA  | TTCTT  | TTCTC  | TTCTG  | TTCCA  | TTCCT  | TTC CC | TTC CG | TTC GA | TTC GT |
| TTG | TTGAA | TTGAT | TTGAC | TTGAG | TTGTA  | TTGTT  | TTGTC  | TTGTG  | TTGCA  | TTGCT  | TTGCC  | TTGCG  | TTGGA  | TTGGT  |
| TCA | TCAAA | TCAAT | TCAAC | TCAAG | TCATA  | TCATT  | TCATC  | TCATG  | TCACA  | TCACT  | TCACC  | TCACG  | TCAGA  | TCAGT  |
| TCT | TCTAA | TCTAT | TCTAC | TCTAG | TCTTA  | TCTTT  | TCTTC  | TCTTG  | TCTCA  | TCTCT  | TCTCC  | TCTCG  | TCTGA  | TCTGT  |
| TCC | TCCAA | TCCAT | TCCAC | TCCAG | TCCTA  | TCCTT  | TCCTC  | TCCTG  | TCCCA  | TCCCT  | TCCCC  | TCCCG  | TCCGA  | TCCGT  |

|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| TCG | TCGAA | TCGAT | TCGAC | TCGAG | TCGTA | TCGTT | TCGTC | TCGTG | TCGCA | TCGCT | TCGCC | TCGCG | TCGGA | TCGGT |
| TGA | TGAAA | TGAAT | TGAAC | TGAAG | TGATA | TGATT | TGATC | TGATG | TGACA | TGACT | TGACC | TGACG | TGAGA | TGAGT |
| TGT | TGTAA | TGTAT | TGTAC | TGTAG | TGTTA | TGTTT | TGTTT | TGTTG | TGTCA | TGTCT | TGTCC | TGTCT | TGTGA | TGTGT |
| TGC | TGCAA | TGCAT | TGCAC | TGCAG | TGCTA | TGCTT | TGCTC | TGCTG | TGCCA | TGCCT | TGCCC | TGCCG | TGCCA | TGCCG |
| TGG | TGGAA | TGGAT | TGGAC | TGGAG | TGGTA | TGGTT | TGGTC | TGGTG | TGGCA | TGGCT | TGGCC | TGGCG | TGGGA | TGGGT |
| CAA | CAAAA | CAAAT | CAAAC | CAAAG | CAATA | CAATT | CAATC | CAATG | CAACA | CAACT | CAACC | CAACG | CAAGA | CAAGT |
| CAT | CATAA | CATAT | CATAC | CATAG | CATTA | CATTT | CATTC | CATTG | CATCA | CATCT | CATCC | CATCG | CATGA | CATGT |
| CAC | CACAA | CACAT | CACAC | CACAG | CACTA | CACTT | CACTC | CACTG | CACCA | CACCT | CACCC | CACCG | CACGA | CACGT |
| CAG | CAGAA | CAGAT | CAGAC | CAGAG | CAGTA | CAGTT | CAGTC | CAGTG | CAGCA | CAGCT | CAGCC | CAGCG | CAGGA | CAGGT |
| CTA | CTAAA | CTAAT | CTAAC | CTAAG | CTATA | CTATT | CTATC | CTATG | CTACA | CTACT | CTACC | CTACG | CTAGA | CTAGT |
| CTT | CTTAA | CTTAT | CTTAC | CTTAG | CTTTA | CTTTT | CTTTC | CTTTG | CTTCA | CTTCT | CTTCC | CTTCG | CTTGA | CTTGT |
| CTC | CTCAA | CTCAT | CTCAC | CTCAG | CTCTA | CTCTT | CTCTC | CTCTG | CTCCA | CTCCT | CTCCC | CTCCG | CTCGA | CTCGT |
| CTG | CTGAA | CTGAT | CTGAC | CTGAG | CTGTA | CTGTT | CTGTC | CTGTG | CTGCA | CTGCT | CTGCC | CTGCG | CTGGA | CTGGT |
| CCA | CCAAA | CCAAT | CCAAC | CCAAG | CCATA | CCATT | CCATC | CCATG | CCACA | CCACT | CCACC | CCACG | CCAGA | CCAGT |
| CCT | CCTAA | CCTAT | CCTAC | CCTAG | CCTTA | CCTTT | CCTTC | CCTTG | CCTCA | CCTCT | CCTCC | CCTCG | CCTGA | CCTGT |
| CCC | CCCAA | CCCAT | CCCAC | CCCAG | CCCTA | CCCTT | CCCTC | CCCTG | CCCCA | CCCCT | CCCCC | CCCCG | CCCGA | CCCGT |
| CCG | CCGAA | CCGAT | CCGAC | CCGAG | CCGTA | CCGTT | CCGTC | CCGTG | CCGCA | CCGCT | CCGCC | CCGCG | CCGGA | CCGGT |
| CGA | CGAAA | CGAAT | CGAAC | CGAAG | CGATA | CGATT | CGATC | CGATG | CGACA | CGACT | CGACC | CGACG | CGAGA | CGAGT |
| CGT | CGTAA | CGTAT | CGTAC | CGTAG | CGTTA | CGTTT | CGTTC | CGTTG | CGTCA | CGTCT | CGTCC | CGTCG | CGTGA | CGTGT |
| CGC | CGCAA | CGCAT | CGCAC | CGCAG | CGCTA | CGCTT | CGCTC | CGCTG | CGCCA | CGCCT | CGCCC | CGCCG | CGCGA | CGCGT |
| CGG | CGGAA | CGGAT | CGGAC | CGGAG | CGGTA | CGGTT | CGGTC | CGGTG | CGGCA | CGGCT | CGGCC | CGGCG | CGGGA | CGGGT |
| GAA | GAAAA | GAAAT | GAAAC | GAAAG | GAATA | GAATT | GAATC | GAATG | GAACA | GAACT | GAACC | GAACG | GAAGA | GAAGT |
| GAT | GATAA | GATAT | GATAC | GATAG | GATTA | GATTT | GATTC | GATTG | GATCA | GATCT | GATCC | GATCG | GATGA | GATGT |
| GAC | GACAA | GACAT | GACAC | GACAG | GACTA | GACTT | GACTC | GACTG | GACCA | GACCT | GACCC | GACCG | GACGA | GACGT |
| GAG | GAGAA | GAGAT | GAGAC | GAGAG | GAGTA | GAGTT | GAGTC | GAGTG | GAGCA | GAGCT | GAGCC | GAGCG | GAGGA | GAGGT |
| GTA | GTAAA | GTAAT | GTAAC | GTAAG | GTATA | GTATT | GTATC | GTATG | GTACA | GTACT | GTACC | GTACG | GTAGA | GTAGT |

|     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| GTT | GT TAA | GT TAT | GT TAC | GT TAG | GT TTA | GT TTT | GT TTC | GT TTG | GT TCA | GT TCT | GT TCC | GT TCG | GT TGA | GT TGT |
| GTC | GT CAA | GT CAT | GT CAC | GT CAG | GT CTA | GT CTT | GT CTC | GT CTG | GT CCA | GT CCT | GT CCC | GT CCG | GT CGA | GT CGT |
| GTG | GT GAA | GT GAT | GT GAC | GT GAG | GT GTA | GT GTT | GT GTC | GT GTG | GT GCA | GT GCT | GT GCC | GT GCG | GT GGA | GT GGT |
| GCA | GC AAA | GC AAT | GC AAC | GC AAG | GC ATA | GC ATT | GC ATC | GC ATG | GC ACA | GC ACT | GC ACC | GC ACG | GC AGA | GC AGT |
| GCT | GC TAA | GC TAT | GC TAC | GC TAG | GC TTA | GC TTT | GC TTC | GC TTG | GC TCA | GC TCT | GC TCC | GC TCG | GC TGA | GC TGT |
| GCC | GC CAA | GC CAT | GC CAC | GC CAG | GC CTA | GC CTT | GC CTC | GC CTG | GC CCA | GC CCT | GC CCC | GC CCG | GC CGA | GC CGT |
| GCG | GC GAA | GC GAT | GC GAC | GC GAG | GC GTA | GC GTT | GC GTC | GC GTG | GC GCA | GC GCT | GC GCC | GC GCG | GC GGA | GC GGT |
| GGA | GG AAA | GG AAT | GG AAC | GG AAG | GG ATA | GG ATT | GG ATC | GG ATG | GG ACA | GG ACT | GG ACC | GG ACG | GG AGA | GG AGT |
| GGT | GG TAA | GG TAT | GG TAC | GG TAG | GG TTA | GG TTT | GG TTC | GG TTG | GG TCA | GG TCT | GG TCC | GG TCG | GG TGA | GG TGT |
| GGC | GG CAA | GG CAT | GG CAC | GG CAG | GG CTA | GG CTT | GG CTC | GG CTG | GG CCA | GG CCT | GG CCC | GG CCG | GG CGA | GG CGT |
| GGG | GG GAA | GG GAT | GG GAC | GG GAG | GG GTA | GG GTT | GG GTC | GG GTG | GG GCA | GG GCT | GG GCC | GG GCG | GG GGA | GG GGT |

**After filtering: read2: quality**

**Value of each position will be shown on mouse over.**

**After filtering: read2: base contents**

**Value of each position will be shown on mouse over.**

**After filtering: read2: KMER counting**

Darker background means larger counts. The count will be shown on mouse over.

|     | AA    | AT    | AC    | AG    | TA    | TT     | TC     | TG     | CA      | CT      | CC      | CG      | GA      | GT      |
|-----|-------|-------|-------|-------|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| AAA | AAAAA | AAAAT | AAAAC | AAAAG | AAATA | AAATT  | AAATC  | AAATG  | AAACA   | AAACT   | AAACC   | AAACG   | AAAGA   | AAAGT   |
| AAT | AATAA | AATAT | AATAC | AATAG | AATTA | AATTT  | AATTC  | AATTG  | AATCA   | AATCT   | AATCC   | AATCG   | AATGA   | AATGT   |
| AAC | AACAA | AACAT | AACAC | AACAG | AACTA | AAC TT | AAC TC | AAC TG | AAC CA  | AAC CT  | AAC CC  | AAC CG  | AAC GA  | AAC GT  |
| AAG | AAGAA | AAGAT | AAGAC | AAGAG | AAGTA | AAGTT  | AAGTC  | AAGTG  | AAGCA   | AAGCT   | AAGCC   | AAGCG   | AAGGA   | AAGGT   |
| ATA | ATAAA | ATAAT | ATAAC | ATAAG | ATATA | ATATT  | ATATC  | ATATG  | ATACA   | ATACT   | ATACC   | ATACG   | ATAGA   | ATAGT   |
| ATT | ATTAA | ATTAT | ATTAC | ATTAG | ATTTA | ATTTT  | ATTT C | ATTT G | ATTT CA | ATTT CT | ATTT CC | ATTT CG | ATTT GA | ATTT GT |
| ATC | ATCAA | ATCAT | ATCAC | ATCAG | ATCTA | ATCTT  | ATCTC  | ATCTG  | ATCCA   | ATCCT   | ATCCC   | ATCCG   | ATCGA   | ATCGT   |
| ATG | ATGAA | ATGAT | ATGAC | ATGAG | ATGTA | ATGTT  | ATGTC  | ATGTG  | ATGCA   | ATGCT   | ATGCC   | ATGCG   | ATGGA   | ATGGT   |
| ACA | ACAAA | ACAAT | ACAAC | ACAAG | ACATA | ACATT  | ACATC  | ACATG  | ACACA   | ACACT   | ACACC   | ACACG   | ACAGA   | ACAGT   |
| ACT | ACTAA | ACTAT | ACTAC | ACTAG | ACTTA | ACTTT  | ACTTC  | ACTTG  | ACTCA   | ACTCT   | ACTCC   | ACTCG   | ACTGA   | ACTGT   |
| ACC | ACCAA | ACCAT | ACCAC | ACCAG | ACCTA | ACCTT  | ACCTC  | ACCTG  | ACCCA   | ACCCT   | ACCCC   | ACCCG   | ACCGA   | ACCGT   |
| ACG | ACGAA | ACGAT | ACGAC | ACGAG | ACGTA | ACGTT  | ACGTC  | ACGTG  | ACGCA   | ACGCT   | ACGCC   | ACGCG   | ACGGA   | ACGGT   |
| AGA | AGAAA | AGAAT | AGAAC | AGAAG | AGATA | AGATT  | AGATC  | AGATG  | AGACA   | AGACT   | AGACC   | AGACG   | AGAGA   | AGAGT   |
| AGT | AGTAA | AGTAT | AGTAC | AGTAG | AGTTA | AGTTT  | AGTTC  | AGTTG  | AGTCA   | AGTCT   | AGTCC   | AGTCG   | AGTGA   | AGTGT   |
| AGC | AGCAA | AGCAT | AGCAC | AGCAG | AGCTA | AGCTT  | AGCTC  | AGCTG  | AGCCA   | AGCCT   | AGCCC   | AGCCG   | AGCGA   | AGCGT   |
| AGG | AGGAA | AGGAT | AGGAC | AGGAG | AGGTA | AGGTT  | AGGTC  | AGGTG  | AGGCA   | AGGCT   | AGGCC   | AGGCG   | AGGGA   | AGGGT   |
| TAA | TAAAA | TAAAT | TAAAC | TAAAG | TAATA | TAATT  | TAATC  | TAATG  | TAACA   | TAACT   | TAACC   | TAACG   | TAAGA   | TAAGT   |
| TAT | TATAA | TATAT | TATAC | TATAG | TATTA | TATTT  | TATTC  | TATTG  | TATCA   | TATCT   | TATCC   | TATCG   | TATGA   | TATGT   |
| TAC | TACAA | TACAT | TACAC | TACAG | TACTA | TACTT  | TACTC  | TACTG  | TACCA   | TACCT   | TACCC   | TACCG   | TACGA   | TACGT   |
| TAG | TAGAA | TAGAT | TAGAC | TAGAG | TAGTA | TAGTT  | TAGTC  | TAGTG  | TAGCA   | TAGCT   | TAGCC   | TAGCG   | TAGGA   | TAGGT   |
| TTA | TTAAA | TTAAT | TTAAC | TTAAG | TTATA | TTATT  | TTATC  | TTATG  | TTACA   | TTACT   | TTACC   | TTACG   | TTAGA   | TTAGT   |
| TTT | TTTAA | TTTAT | TTTAC | TTTAG | TTTTA | TTTTT  | TTTT C | TTTT G | TTTT CA | TTTT CT | TTTT CC | TTTT CG | TTTT GA | TTTT GT |
| TTC | TTCAA | TTCAT | TTCAC | TTCAG | TTCTA | TTCTT  | TTCTC  | TTCTG  | TTCCA   | TTCCT   | TTC CC  | TTC CG  | TTC GA  | TTC GT  |

|     |       |       |       |       |       |       |       |       |       |       |       |        |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
|     |       |       |       |       |       |       |       |       |       |       |       |        |       |       |
| TTG | TTGAA | TTGAT | TTGAC | TTGAG | TTGTA | TTGTT | TTGTC | TTGTG | TTGCA | TTGCT | TTGCC | TTGCG  | TTGGA | TTGGT |
| TCA | TCAAA | TCAAT | TCAAC | TCAAG | TCATA | TCATT | TCATC | TCATG | TCACA | TCACT | TCACC | TCACG  | TCAGA | TCAGT |
| TCT | TCTAA | TCTAT | TCTAC | TCTAG | TCTTA | TCTTT | TCTTC | TCTTG | TCTCA | TCTCT | TCTCC | TCTCG  | TCTGA | TCTGT |
| TCC | TCCAA | TCCAT | TCCAC | TCCAG | TCCTA | TCCTT | TCCTC | TCCTG | TCCCA | TCCCT | TCCCC | TCCCG  | TCCGA | TCCGT |
| TCG | TCGAA | TCGAT | TCGAC | TCGAG | TCGTA | TCGTT | TCGTC | TCGTG | TCGCA | TCGCT | TCGCC | TCGCG  | TCGGA | TCGGT |
| TGA | TGAAA | TGAAT | TGAAC | TGAAG | TGATA | TGATT | TGATC | TGATG | TGACA | TGACT | TGACC | TGACG  | TGAGA | TGAGT |
| TGT | TGTAA | TGTAT | TGTAC | TGTAG | TGTTA | TGTTT | TGTTC | TGTTG | TGTCA | TGTCT | TGTCC | TGTCTG | TGTGA | TGTGT |
| TGC | TGCAA | TGCAT | TGCAC | TGCAG | TGCTA | TGCTT | TGCTC | TGCTG | TGCCA | TGCCT | TGCCC | TGCCG  | TGCCA | TGCGT |
| TGG | TGGAA | TGGAT | TGGAC | TGGAG | TGGTA | TGGTT | TGGTC | TGGTG | TGGCA | TGGCT | TGGCC | TGGCG  | TGGGA | TGGGT |
| CAA | CAAAA | CAAAT | CAAAC | CAAAG | CAATA | CAATT | CAATC | CAATG | CAACA | CAACT | CAACC | CAACG  | CAAGA | CAAGT |
| CAT | CATAA | CATAT | CATAC | CATAG | CATTA | CATTT | CATTC | CATTG | CATCA | CATCT | CATCC | CATCG  | CATGA | CATGT |
| CAC | CACAA | CACAT | CACAC | CACAG | CACTA | CACTT | CACTC | CACTG | CACCA | CACCT | CACCC | CACCG  | CACGA | CACGT |
| CAG | CAGAA | CAGAT | CAGAC | CAGAG | CAGTA | CAGTT | CAGTC | CAGTG | CAGCA | CAGCT | CAGCC | CAGCG  | CAGGA | CAGGT |
| CTA | CTAAA | CTAAT | CTAAC | CTAAG | CTATA | CTATT | CTATC | CTATG | CTACA | CTACT | CTACC | CTACG  | CTAGA | CTAGT |
| CTT | CTTAA | CTTAT | CTTAC | CTTAG | CTTTA | CTTTT | CTTTC | CTTTG | CTTCA | CTTCT | CTTCC | CTTCG  | CTTGA | CTTGT |
| CTC | CTCAA | CTCAT | CTCAC | CTCAG | CTCTA | CTCTT | CTCTC | CTCTG | CTCCA | CTCCT | CTCCC | CTCCG  | CTCGA | CTCGT |
| CTG | CTGAA | CTGAT | CTGAC | CTGAG | CTGTA | CTGTT | CTGTC | CTGTG | CTGCA | CTGCT | CTGCC | CTGCG  | CTGGA | CTGGT |
| CCA | CCAAA | CCAAT | CCAAC | CCAAG | CCATA | CCATT | CCATC | CCATG | CCACA | CCACT | CCACC | CCACG  | CCAGA | CCAGT |
| CCT | CCTAA | CCTAT | CCTAC | CCTAG | CCTTA | CCTTT | CCTTC | CCTTG | CCTCA | CCTCT | CCTCC | CCTCG  | CCTGA | CCTGT |
| CCC | CCCAA | CCCAT | CCCAC | CCCAG | CCCTA | CCCTT | CCCTC | CCCTG | CCCCA | CCCCT | CCCCC | CCCCG  | CCCGA | CCCGT |
| CCG | CCGAA | CCGAT | CCGAC | CCGAG | CCGTA | CCGTT | CCGTC | CCGTG | CCGCA | CCGCT | CCGCC | CCGCG  | CCGGA | CCGGT |
| CGA | CGAAA | CGAAT | CGAAC | CGAAG | CGATA | CGATT | CGATC | CGATG | CGACA | CGACT | CGACC | CGACG  | CGAGA | CGAGT |
| CGT | CGTAA | CGTAT | CGTAC | CGTAG | CGTTA | CGTTT | CGTTC | CGTTG | CGTCA | CGTCT | CGTCC | CGTCG  | CGTGA | CGTGT |
| CGC | CGCAA | CGCAT | CGCAC | CGCAG | CGCTA | CGCTT | CGCTC | CGCTG | CGCCA | CGCCT | CGCCC | CGCCG  | CGCGA | CGCGT |
| CGG | CGGAA | CGGAT | CGGAC | CGGAG | CGGTA | CGGTT | CGGTC | CGGTG | CGGCA | CGGCT | CGGCC | CGGCG  | CGGGA | CGGGT |
| GAA | GAAAA | GAAAT | GAAAC | GAAAG | GAATA | GAATT | GAATC | GAATG | GAACA | GAACT | GAACC | GAACG  | GAAGA | GAAGT |

|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| GAT | GATAA | GATAT | GATAC | GATAG | GATTA | GATTT | GATTC | GATTG | GATCA | GATCT | GATCC | GATCG | GATGA | GATGT |
| GAC | GACAA | GACAT | GACAC | GACAG | GACTA | GACTT | GACTC | GACTG | GACCA | GACCT | GACCC | GACCG | GACGA | GACGT |
| GAG | GAGAA | GAGAT | GAGAC | GAGAG | GAGTA | GAGTT | GAGTC | GAGTG | GAGCA | GAGCT | GAGCC | GAGCG | GAGGA | GAGGT |
| GTA | GTAAA | GTAAT | GTAAC | GTAAG | GTATA | GTATT | GTATC | GTATG | GTACA | GTACT | GTACC | GTACG | GTAGA | GTAGT |
| GTT | GTTAA | GTTAT | GTTAC | GTTAG | GTTTA | GTTTT | GTTTC | GTTTG | GTTCA | GTTCT | GTTCC | GTTCG | GTTGA | GTTGT |
| GTC | GTCAA | GTCAT | GTCAC | GTCAG | GTCTA | GTCTT | GTCTC | GTCTG | GTCCA | GTCCT | GTCCC | GTCCG | GTCGA | GTCGT |
| GTG | GTGAA | GTGAT | GTGAC | GTGAG | GTGTA | GTGTT | GTGTC | GTGTG | GTGCA | GTGCT | GTGCC | GTGCG | GTGGA | GTGGT |
| GCA | GCAAA | GCAAT | GCAAC | GCAAG | GCATA | GCATT | GCATC | GCATG | GCACA | GCACT | GCACC | GCACG | GCAGA | GCAGT |
| GCT | GCTAA | GCTAT | GCTAC | GCTAG | GCTTA | GCTTT | GCTTC | GCTTG | GCTCA | GCTCT | GCTCC | GCTCG | GCTGA | GCTGT |
| GCC | GCCAA | GCCAT | GCCAC | GCCAG | GCCTA | GCCTT | GCCTC | GCCTG | GCCCA | GCCCT | GCCCC | GCCCG | GCCGA | GCCGT |
| GCG | GCGAA | GCGAT | GCGAC | GCGAG | GCGTA | GCGTT | GCGTC | GCGTG | GCGCA | GCGCT | GCGCC | GCGCG | GCGGA | GCGGT |
| GGA | GGAAA | GGAAT | GGAAC | GGAAG | GGATA | GGATT | GGATC | GGATG | GGACA | GGACT | GGACC | GGACG | GGAGA | GGAGT |
| GGT | GGTAA | GGTAT | GGTAC | GGTAG | GGTTA | GGTTT | GGTTC | GGTTG | GGTCA | GGTCT | GGTCC | GGTCG | GGTGA | GGTGT |
| GGC | GGCAA | GGCAT | GGCAC | GGCAG | GGCTA | GGCTT | GGCTC | GGCTG | GGCCA | GGCCT | GGCCC | GGCCG | GGCGA | GGCGT |
| GGG | GGGAA | GGGAT | GGGAC | GGGAG | GGGTA | GGGTT | GGGTC | GGGTG | GGGCA | GGGCT | GGGCC | GGGCG | GGGGA | GGGGT |

```
fastp -i 78832_S2_L002_R1_001.fastq.gz -I 78832_S2_L002_R2_001.fastq.gz -o cleaned/78832_S2_L002-R1.fastq.gz -O
cleaned/78832_S2_L002-R2.fastq.gz --html reports/78832_S2_L002.html --json reports/78832_S2_L002.json
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fastp 0.20.0, at 2023-04-08 05:43:45