



Results Analysis:

Model Accuracy	Without Correction	With Correction
Method 1	95.87 %	98.29 %
Method 2	95.96 %	98.29 %

a) Method 1:

- Without zero count correction:

Test set: 1 P_ham= 6.301755724323168e-13 P_spam= 0.0 Predicted tag: ham
Test set: 2 P_ham= 0.0 P_spam= 0.0 Predicted tag: spam
Test set: 3 P_ham= 1.4616839843775638e-36 P_spam= 0.0 Predicted tag: ham
Test set: 4 P_ham= 2.1701488161121115e-37 P_spam= 0.0 Predicted tag: ham
Test set: 5 P_ham= 7.421384603543728e-13 P_spam= 0.0 Predicted tag: ham
Test set: 6 P_ham= 8.642064838959154e-15 P_spam= 0.0 Predicted tag: ham
Test set: 7 P_ham= 1.2535343130693396e-06 P_spam= 0.0 Predicted tag: ham
Test set: 8 P_ham= 0.0 P_spam= 0.0 Predicted tag: spam
Test set: 9 P_ham= 2.602526255909777e-05 P_spam= 0.0 Predicted tag: ham
Test set: 10 P_ham= 8.212102400617699e-26 P_spam= 0.0 Predicted tag: ham
Test set: 11 P_ham= 0.00012580445447882033 P_spam= 0.0 Predicted tag: ham
Test set: 12 P_ham= 2.2467428506652156e-30 P_spam= 0.0 Predicted tag: ham
Test set: 13 P_ham= 2.1205456637089442e-16 P_spam= 0.0 Predicted tag: ham
Test set: 14 P_ham= 0.0001443641438410267 P_spam= 0.0 Predicted tag: ham
Test set: 15 P_ham= 1.995717926369375e-09 P_spam= 8.60024794775778e-06
Predicted tag: spam
Test set: 16 P_ham= 1.1864660342763252e-05 P_spam= 0.0 Predicted tag: ham
Test set: 17 P_ham= 0.00026624117319393176 P_spam= 0.0 Predicted tag: ham
Test set: 18 P_ham= 2.091948920112213e-05 P_spam= 0.0 Predicted tag: ham
Test set: 19 P_ham= 4.3896926602920094e-13 P_spam= 0.0 Predicted tag: ham
Test set: 20 P_ham= 4.247866050177914e-08 P_spam= 0.0 Predicted tag: ham
Test set: 21 P_ham= 0.005795247237677476 P_spam= 0.0 Predicted tag: ham
Test set: 22 P_ham= 0.8649921507064364 P_spam= 0.13500784929356358
Predicted tag: ham
Test set: 23 P_ham= 4.0398897955436285e-07 P_spam= 0.0 Predicted tag: ham
Test set: 24 P_ham= 0.004012188378993898 P_spam= 0.0 Predicted tag: ham
Test set: 25 P_ham= 1.1347697224495653e-11 P_spam= 0.0 Predicted tag: ham
Test set: 26 P_ham= 2.231114957172599e-16 P_spam= 0.0 Predicted tag: ham
Test set: 27 P_ham= 0.0004499117169526373 P_spam= 0.0 Predicted tag: ham
Test set: 28 P_ham= 0.0010014498431994458 P_spam= 0.0 Predicted tag: ham
Test set: 29 P_ham= 0.0038607060122135784 P_spam= 4.361630509351807e-05
Predicted tag: ham
Test set: 30 P_ham= 3.4406201033541234e-14 P_spam= 0.0 Predicted tag: ham



Test set: 31 P_ham= 7.258421669598323e-09 P_spam= 0.0 Predicted tag: ham
Test set: 32 P_ham= 1.0444599435410548e-08 P_spam= 0.0 Predicted tag: ham
Test set: 33 P_ham= 1.1731193375277431e-19 P_spam= 0.0 Predicted tag: ham
Test set: 34 P_ham= 4.12261944405728e-20 P_spam= 0.0 Predicted tag: ham
Test set: 35 P_ham= 0.0006752954767506508 P_spam= 0.0 Predicted tag: ham
Test set: 36 P_ham= 4.566642753834333e-09 P_spam= 0.0 Predicted tag: ham
Test set: 37 P_ham= 8.988605097965876e-13 P_spam= 0.0 Predicted tag: ham
Test set: 38 P_ham= 3.2880907491113445e-18 P_spam= 0.0 Predicted tag: ham
Test set: 39 P_ham= 8.479122534197757e-20 P_spam= 0.0 Predicted tag: ham
Test set: 40 P_ham= 0.16446653998924557 P_spam= 0.0 Predicted tag: ham
Test set: 41 P_ham= 0.0 P_spam= 1.6594614562831327e-05 Predicted tag: spam
Test set: 42 P_ham= 0.0 P_spam= 3.299971854442993e-10 Predicted tag: spam
Test set: 43 P_ham= 0.0005405569480405428 P_spam= 0.0 Predicted tag: ham
Test set: 44 P_ham= 0.001105931953533832 P_spam= 0.0 Predicted tag: ham
Test set: 45 P_ham= 2.4383095029264465e-06 P_spam= 0.0 Predicted tag: ham
Test set: 46 P_ham= 0.005533689853027252 P_spam= 0.0 Predicted tag: ham
Test set: 47 P_ham= 5.299437227455169e-09 P_spam= 0.0 Predicted tag: ham
Test set: 48 P_ham= 0.0 P_spam= 0.0 Predicted tag: spam
Test set: 49 P_ham= 0.00011882396307993021 P_spam= 0.0 Predicted tag: ham
Test set: 50 P_ham= 8.063150915559403e-26 P_spam= 0.0 Predicted tag: ham
Accuracy is : **95.87443946188341 percent**

- With the correction (Bonus)

Test set: 1 P_ham= 2.6845584918256135e-13 P_spam= 1.9533204260822146e-22
Predicted tag: ham
Test set: 2 P_ham= 7.101375221135352e-25 P_spam= 2.1792258362252996e-18
Predicted tag: spam
Test set: 3 P_ham= 1.3904643876811225e-38 P_spam= 2.1122888971177837e-60
Predicted tag: ham
Test set: 4 P_ham= 2.160822239114852e-39 P_spam= 1.1248794223929011e-63
Predicted tag: ham
Test set: 5 P_ham= 1.4596866501826938e-13 P_spam= 9.687350222977401e-24
Predicted tag: ham
Test set: 6 P_ham= 1.2711779870358917e-15 P_spam= 3.3018654772459044e-34
Predicted tag: ham
Test set: 7 P_ham= 7.656752668480697e-06 P_spam= 1.1663540486518582e-07
Predicted tag: ham
Test set: 8 P_ham= 2.559925170694631e-07 P_spam= 3.720993015122644e-06
Predicted tag: spam
Test set: 9 P_ham= 1.0496314771717442e-05 P_spam= 4.4216749150384307e-10
Predicted tag: ham



Test set: 10 P_ham= 2.3324134670498714e-27 P_spam= 3.2937936013097314e-43 Predicted tag: ham
Test set: 11 P_ham= 9.980059479774829e-05 P_spam= 3.791625662610935e-07 Predicted tag: ham
Test set: 12 P_ham= 2.3236808442634088e-32 P_spam= 2.55197320219704e-57 Predicted tag: ham
Test set: 13 P_ham= 2.892943222854376e-17 P_spam= 7.67990253586863e-27 Predicted tag: ham
Test set: 14 P_ham= 0.000172908711185504 P_spam= 8.827090483497518e-07 Predicted tag: ham
Test set: 15 P_ham= 2.448962484097612e-09 P_spam= 3.278019802910042e-07 Predicted tag: spam
Test set: 16 P_ham= 5.643414975473446e-06 P_spam= 2.9321148586732747e-10 Predicted tag: ham
Test set: 17 P_ham= 0.0003116803960811311 P_spam= 8.83939291081583e-05 Predicted tag: ham
Test set: 18 P_ham= 1.0924952735778422e-05 P_spam= 4.107706524351848e-09 Predicted tag: ham
Test set: 19 P_ham= 4.4147196874583996e-14 P_spam= 4.466633521024372e-25 Predicted tag: ham
Test set: 20 P_ham= 2.5814752610872922e-08 P_spam= 7.237790662347254e-11 Predicted tag: ham
Test set: 21 P_ham= 0.0035449418192870963 P_spam= 4.6236103094304765e-08 Predicted tag: ham
Test set: 22 P_ham= 0.8649921507064364 P_spam= 0.13500784929356358 Predicted tag: ham
Test set: 23 P_ham= 2.324361368134851e-07 P_spam= 1.1141117013345593e-11 Predicted tag: ham
Test set: 24 P_ham= 0.005368077712880791 P_spam= 0.00048040206916744033 Predicted tag: ham
Test set: 25 P_ham= 3.37678021116509e-12 P_spam= 3.0060605446656297e-21 Predicted tag: ham
Test set: 26 P_ham= 6.806121256699328e-17 P_spam= 9.825372836637777e-30 Predicted tag: ham
Test set: 27 P_ham= 0.00042272180432164984 P_spam= 2.0914848980507672e-07 Predicted tag: ham
Test set: 28 P_ham= 0.000951138293023825 P_spam= 2.3270254007548225e-06 Predicted tag: ham
Test set: 29 P_ham= 0.002440332232805542 P_spam= 1.5998782532483336e-05 Predicted tag: ham
Test set: 30 P_ham= 2.2653593010713555e-14 P_spam= 1.8386455906803966e-18 Predicted tag: ham
Test set: 31 P_ham= 2.9244931449729826e-09 P_spam= 5.270249258632799e-12 Predicted tag: ham



Test set: 32 P_ham= 1.0614901312707211e-08 P_spam= 3.6855870138006567e-10 Predicted tag: ham
Test set: 33 P_ham= 1.7828211401004534e-20 P_spam= 7.807643412415411e-33 Predicted tag: ham
Test set: 34 P_ham= 9.47705555485624e-21 P_spam= 1.3509290467172673e-32 Predicted tag: ham
Test set: 35 P_ham= 0.0004657765224850553 P_spam= 4.712659325933874e-06 Predicted tag: ham
Test set: 36 P_ham= 1.129482124439764e-09 P_spam= 5.5505956561165514e-17 Predicted tag: ham
Test set: 37 P_ham= 8.411652436761527e-14 P_spam= 3.2028452610770365e-26 Predicted tag: ham
Test set: 38 P_ham= 2.3932967068733075e-19 P_spam= 1.7145973893896796e-29 Predicted tag: ham
Test set: 39 P_ham= 1.9317877347206904e-21 P_spam= 3.4814874829141354e-38 Predicted tag: ham
Test set: 40 P_ham= 0.13937245296578046 P_spam= 0.0004862260121937647 Predicted tag: ham
Test set: 41 P_ham= 7.85468344044823e-20 P_spam= 9.674112867526097e-08 Predicted tag: spam
Test set: 42 P_ham= 1.336472884506589e-25 P_spam= 3.402632037550226e-13 Predicted tag: spam
Test set: 43 P_ham= 0.0005546322547775337 P_spam= 2.3678440313700607e-05 Predicted tag: ham
Test set: 44 P_ham= 0.0009389315073438675 P_spam= 1.243621951710294e-07 Predicted tag: ham
Test set: 45 P_ham= 1.3074118156874227e-06 P_spam= 1.3047958605374915e-09 Predicted tag: ham
Test set: 46 P_ham= 0.0057650080381797765 P_spam= 6.111571837029013e-05 Predicted tag: ham
Test set: 47 P_ham= 1.1975215357138558e-09 P_spam= 1.9762925395548566e-19 Predicted tag: ham
Test set: 48 P_ham= 2.6408841102870092e-14 P_spam= 6.421120390320264e-10 Predicted tag: spam
Test set: 49 P_ham= 5.798317117002871e-05 P_spam= 6.483373441507375e-08 Predicted tag: ham
Test set: 50 P_ham= 4.0005154368655645e-27 P_spam= 4.208007829431326e-53 Predicted tag: ham
Accuracy is : **98.29596412556054 percent**



b) Method 2:

- **Without zero count correction:**

Test set: 1 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
fault
Test set: 2 P_ham= 0 P_spam= 1 Predicted tag: spam
Test set: 3 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 4 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 5 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 6 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 7 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
fault
Test set: 8 P_ham= 0 P_spam= 1 Predicted tag: spam
Test set: 9 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 10 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 11 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 12 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 13 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 14 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 15 P_ham= 0.0002288270964143125 P_spam= 0.9997711729035856
Predicted tag: spam
Test set: 16 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 17 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 18 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 19 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 20 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 21 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 22 P_ham= 0.8649794975171495 P_spam= 0.1350205024828504
Predicted tag: ham
Test set: 23 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 24 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 25 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 26 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 27 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 28 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 29 P_ham= 0.9888301238651274 P_spam= 0.011169876134872695
Predicted tag: ham
Test set: 30 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 31 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 32 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 33 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 34 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham



Test set: 35 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 36 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 37 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 38 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 39 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 40 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 41 P_ham= 0.0 P_spam= 1.0 Predicted tag: spam
Test set: 42 P_ham= 0.0 P_spam= 1.0 Predicted tag: spam
Test set: 43 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 44 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 45 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 46 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 47 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
fault
Test set: 48 P_ham= 0 P_spam= 1 Predicted tag: spam
Test set: 49 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham
Test set: 50 P_ham= 1.0 P_spam= 0.0 Predicted tag: ham

Accuracy is : **95.96412556053812 percent**

- **With the correction (Bonus)**

Test set: 1 P_ham= 0.9999999270841725 P_spam= 7.29158275799711e-08
Predicted tag: ham
Test set: 2 P_ham= 3.583867442383418e-07 P_spam= 0.9999996416132558
Predicted tag: spam
Test set: 3 P_ham= 1.0 P_spam= 3.285843418424937e-20 Predicted tag: ham
Test set: 4 P_ham= 1.0 P_spam= 1.0662550866365998e-24 Predicted tag: ham
Test set: 5 P_ham= 0.999999999365274 P_spam= 6.347257878706396e-11
Predicted tag: ham
Test set: 6 P_ham= 1.0 P_spam= 1.422337558417824e-17 Predicted tag: ham
Test set: 7 P_ham= 0.9850601101043062 P_spam= 0.014939889895693918
Predicted tag: ham
Test set: 8 P_ham= 0.06528221291682072 P_spam= 0.9347177870831793
Predicted tag: spam
Test set: 9 P_ham= 0.999958654295155 P_spam= 4.134570484504819e-05
Predicted tag: ham
Test set: 10 P_ham= 0.9999999999999715 P_spam= 2.859666612409761e-14
Predicted tag: ham



Test set: 11 P_ham= 0.99620904486387 P_spam= 0.003790955136130055
Predicted tag: ham
Test set: 12 P_ham= 1.0 P_spam= 8.713738612540533e-20 Predicted tag: ham
Test set: 13 P_ham= 0.999999997444976 P_spam= 2.555023847587832e-10
Predicted tag: ham
Test set: 14 P_ham= 0.9949316368023455 P_spam= 0.005068363197654577
Predicted tag: ham
Test set: 15 P_ham= 0.007378771046934628 P_spam= 0.9926212289530654
Predicted tag: spam
Test set: 16 P_ham= 0.9999483561089918 P_spam= 5.1643891008240307e-05
Predicted tag: ham
Test set: 17 P_ham= 0.7798235650277865 P_spam= 0.22017643497221348
Predicted tag: ham
Test set: 18 P_ham= 0.9996251025991011 P_spam= 0.0003748974008989397
Predicted tag: ham
Test set: 19 P_ham= 0.999999999706425 P_spam= 2.9357507903257594e-11
Predicted tag: ham
Test set: 20 P_ham= 0.9972004332836011 P_spam= 0.0027995667163989227
Predicted tag: ham
Test set: 21 P_ham= 0.9999871970695757 P_spam= 1.2802930424240264e-05
Predicted tag: ham
Test set: 22 P_ham= 0.8649028714889578 P_spam= 0.1350971285110421
Predicted tag: ham
Test set: 23 P_ham= 0.999952527363531 P_spam= 4.747263646890611e-05
Predicted tag: ham
Test set: 24 P_ham= 0.9180468295399874 P_spam= 0.0819531704600126
Predicted tag: ham
Test set: 25 P_ham= 0.9999999511631321 P_spam= 4.8836867979510836e-08
Predicted tag: ham
Test set: 26 P_ham= 0.999999999858463 P_spam= 1.4153776869143819e-11
Predicted tag: ham
Test set: 27 P_ham= 0.9995096404976754 P_spam= 0.0004903595023246572
Predicted tag: ham
Test set: 28 P_ham= 0.9975685978830068 P_spam= 0.0024314021169931314
Predicted tag: ham
Test set: 29 P_ham= 0.9934954698141211 P_spam= 0.0065045301858789725
Predicted tag: ham
Test set: 30 P_ham= 0.9999649020563093 P_spam= 3.509794369069909e-05
Predicted tag: ham
Test set: 31 P_ham= 0.9982520133395373 P_spam= 0.0017479866604626232
Predicted tag: ham
Test set: 32 P_ham= 0.9664006027809343 P_spam= 0.03359939721906567
Predicted tag: ham



Test set: 33 P_ham= 0.9999999999990518 P_spam= 9.481390978468795e-13
Predicted tag: ham
Test set: 34 P_ham= 0.9999999999986696 P_spam= 1.3303042924749356e-12
Predicted tag: ham
Test set: 35 P_ham= 0.9899842656260177 P_spam= 0.010015734373982343
Predicted tag: ham
Test set: 36 P_ham= 0.9999999519193467 P_spam= 4.808065332052659e-08
Predicted tag: ham
Test set: 37 P_ham= 0.9999999999941122 P_spam= 5.887766485004471e-12
Predicted tag: ham
Test set: 38 P_ham= 0.9999999998682985 P_spam= 1.317014569377792e-10
Predicted tag: ham
Test set: 39 P_ham= 0.999999999999966 P_spam= 3.412255894637664e-15
Predicted tag: ham
Test set: 40 P_ham= 0.9965269628910339 P_spam= 0.0034730371089661052
Predicted tag: ham
Test set: 41 P_ham= 8.019136322833318e-13 P_spam= 0.9999999999991981
Predicted tag: spam
Test set: 42 P_ham= 3.9025533270219375e-13 P_spam= 0.9999999999996098
Predicted tag: spam
Test set: 43 P_ham= 0.9590492221008733 P_spam= 0.04095077789912661
Predicted tag: ham
Test set: 44 P_ham= 0.9998678291629229 P_spam= 0.00013217083707711257
Predicted tag: ham
Test set: 45 P_ham= 0.9990146304127298 P_spam= 0.0009853695872702277
Predicted tag: ham
Test set: 46 P_ham= 0.9895389196921701 P_spam= 0.010461080307829947
Predicted tag: ham
Test set: 47 P_ham= 0.9999999998377608 P_spam= 1.6223922372251285e-10
Predicted tag: ham
Test set: 48 P_ham= 4.1335276632191685e-05 P_spam= 0.9999586647233678
Predicted tag: spam
Test set: 49 P_ham= 0.9989007008423035 P_spam= 0.0010992991576963928
Predicted tag: ham
Test set: 50 P_ham= 1.0 P_spam= 5.105392768834077e-23 Predicted tag: ham

Accuracy is : **98.29596412556054 percent**